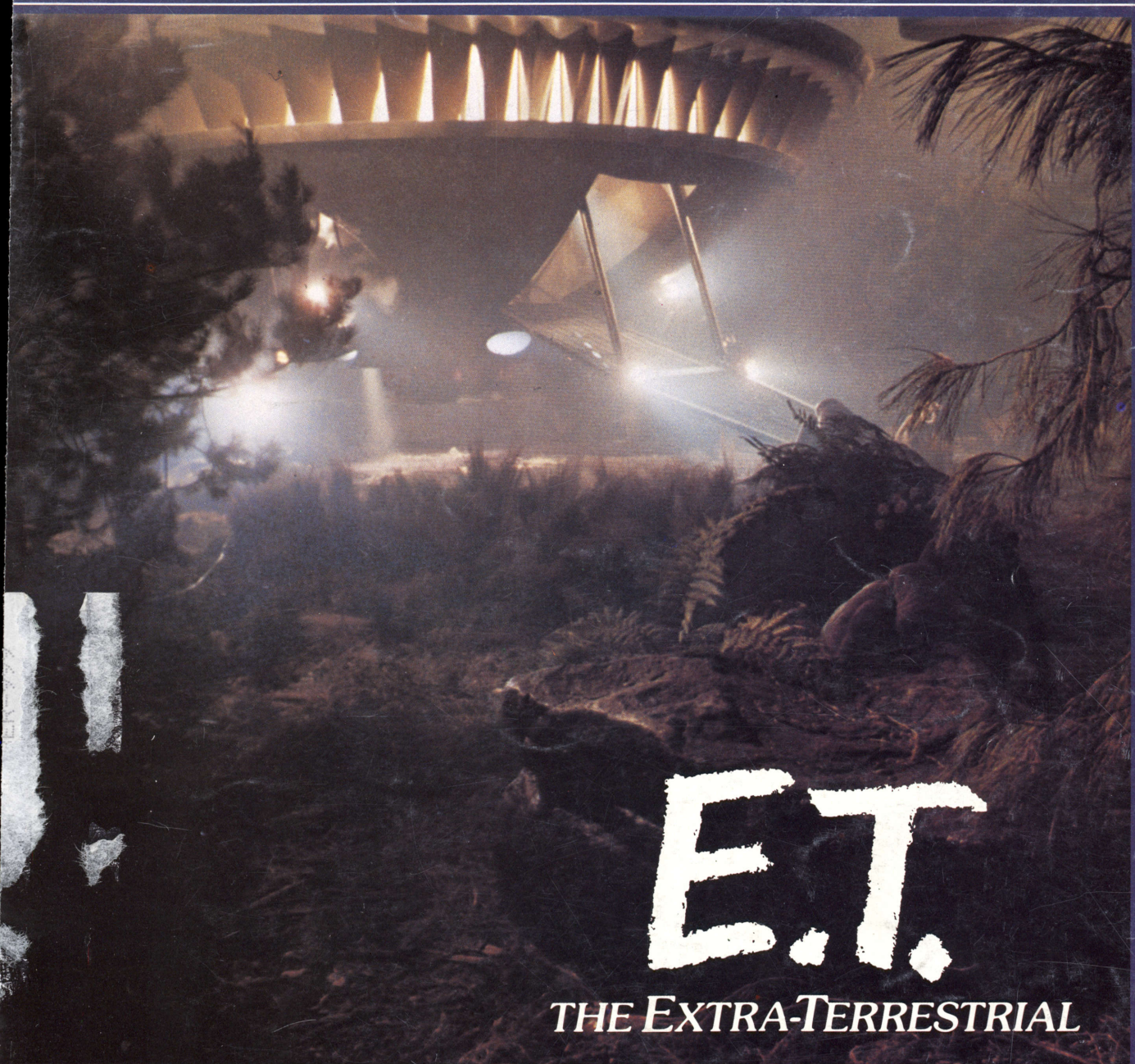


American Cinematographer

INTERNATIONAL JOURNAL OF FILM
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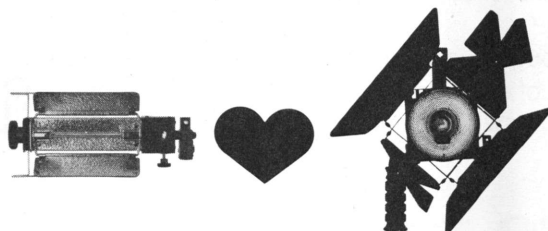
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JANUARY, 1983

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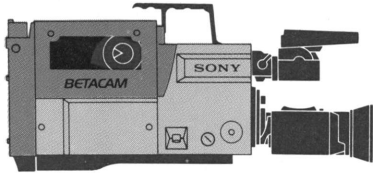
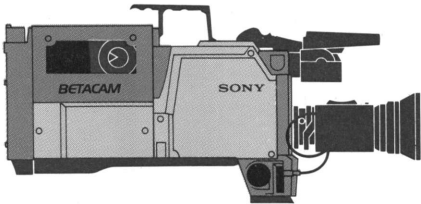
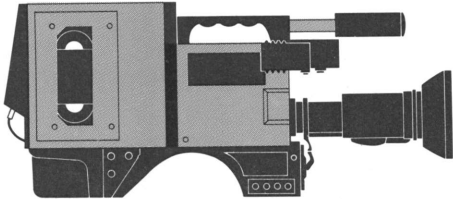
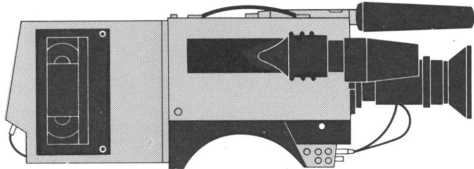
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ON THE COVER

The space ship prepares to depart in a scene from E. T. THE EXTRA TERRESTRIAL, produced by Steven Spielberg and Kathleen Kennedy, directed by Steven Spielberg, written by Melissa Mathison and photographed by Allen Daviau.

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Three Tube 	21.9	17.1
Three Tube 	24.7	17.5
Three Tube 	27.6	21.5

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FROM THE EDITOR

As is probably obvious from our letters column, we are getting a wide variety of reactions to our attempts to incorporate video technology into the magazine. One of the questions that seems to be implicit in many of the comments is that of the relationship between technology and creativity or theory and practice. How much does an artist need to know about the chemical and physical properties of his paint in order to create beautiful pictures? Some might argue that he doesn't need to know anything more than what he can see and feel as he applies the paint to the canvas. Others might say the more he knows about the paint the more control he can have over it and therefore the more he can express with it.

Some filmmakers seem to be put off by the amount of technology associated with video as a production medium even though they take for granted the incredibly sophisticated technology involved in the manufacturing, exposure and processing of motion picture film. In a sense the difference between film and video production is simply that the technology is more visible on a video production. It is as though the laboratory technicians are on the set rather than miles away. The same cameraman who insists he has no use for talk about bandwidth and user bits might well feel perfectly at home with a discussion of the D logE curve or modulation transfer characteristics. Then again plenty of cameramen do excellent work without ever concerning themselves with photographic or optical theory. They simply know what works.

An argument can be made for operating intuitively. Getting overly involved in the technology or theory behind an artistic medium can distract one from the creative process. It can also occasionally result in inhibitions such as an unwillingness to expose a negative "improperly" in order to

achieve a certain effect. Rather than steeping himself in the complexities of optics and chemistry, perhaps a cameraman should devote all of his attention to the aesthetics of lighting and composition and let the technicians take care of the rest.

The extent to which a particular individual grapples with theory is probably not the result of a conscious decision on his part. It is more a reflection of his personality and of the way his mind happens to work. Some people consider theory unnecessary baggage while others experience anxiety if they cannot relate what is happening to some form of theory. I confess I tend toward the latter. If I see someone tweak a knob and change the skin tone in a video image, I want to know why or how that can happen. Conversely I would feel more confident of my ability to create images with the colors I desired if I understood the theory behind the controls at my disposal. I also believe that a theoretical grasp of a system or device enables one to anticipate its limitations rather than waiting to discover them through painful (and costly) experience.

Part of what American Cinematographer is about is theory, but theory from the perspective of the artist and the craftsman. How something works is relevant only if it enables someone to make better use of it. If understanding the NTSC system of encoding chrominance information onto a subcarrier can enable a cameraman to have better control over the color rendition of his video images, then we want to help him understand that. If such theoretical concerns are comparable to understanding the chemistry of dye couplers in the development of a color negative emulsion, then we shall leave it to others to explain. ■

—RICHARD PATTERSON

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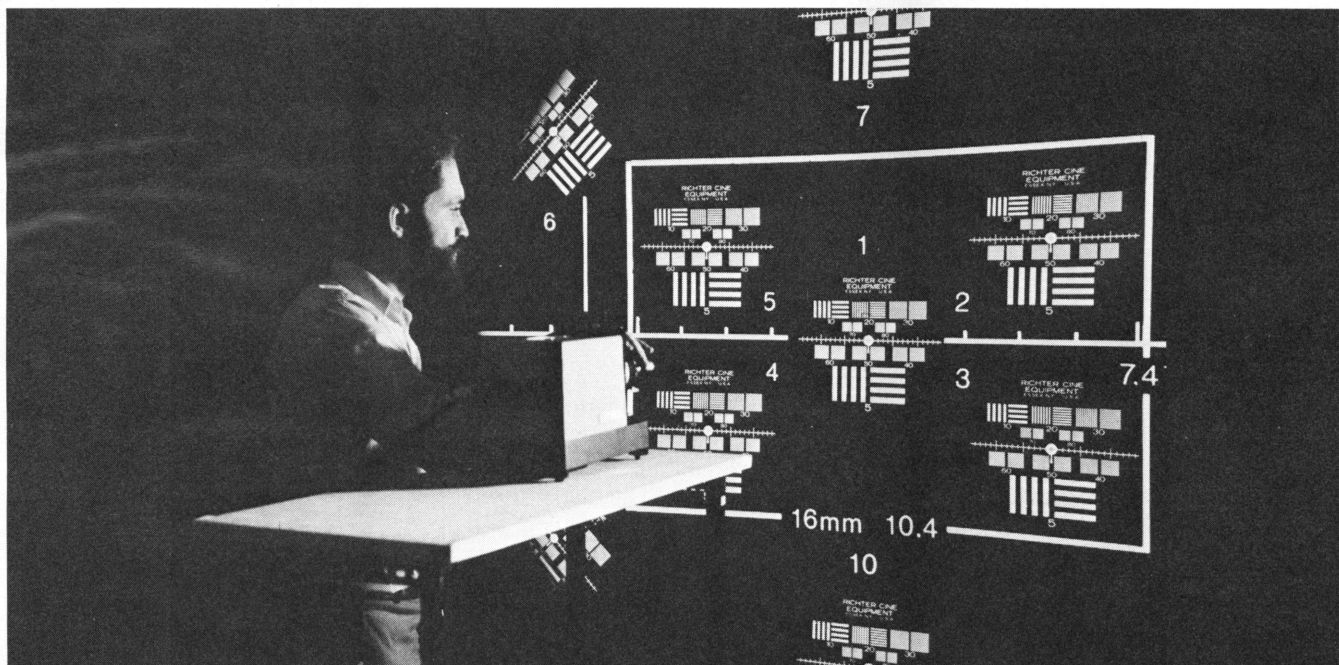
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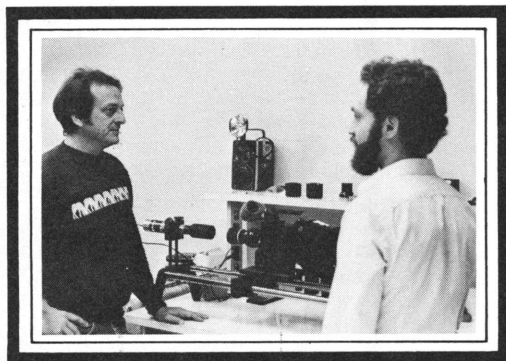
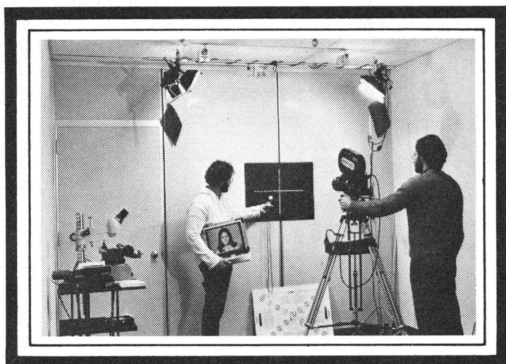
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LETTERS

Technicolor Memory

I would like to make a correction regarding George E. Turner's otherwise very informative article on Gregg Land, ASC, in the November issue. Mr. Turner states that the early Eddie Cantor films: WHOOPÉE (1930), ALMY DAYS (1931), THE KID FROM SPAIN (1932) and ROMAN SCANDALS (1933), were all produced in two-color Technicolor. That is not the case. Only WHOOPÉE was photographed in this process, while ALMY DAYS, THE KID FROM SPAIN and ROMAN SCANDALS were shot in black and white. However, Cantor's MID MILLIONS (1934) had its final sequence shot with the three-color Technicolor system as a test for that newly perfected process.

Abraham Holtz
Philadelphia, PA

Computing Depth of Field

Since the micro-computer age is permeating all aspects of our culture, I thought you might enjoy the program I am enclosing. Please feel free to publish it without any compensation. It is something I just wish to share. The program is a user prompted program which computes hyperfocal distance, then depth of field. It is designed for the non-computer user. I wrote the program on an Osborne I interfaced with an Epson MX-80 printer. The language is MBasic, and the program is very self-contained. I would be glad to make a copy from my disc for anyone for the price of the disk and roundtrip postage. I also have other programs which relate to lighting ratio.

Mark P. Willner
Virginia Beach, VA

While we didn't have space to publish the program, we would be glad to send a copy to anyone who is interested or Mr. Willner can be contacted directly at 5477 Todd Street, Virginia Beach, VA 23464.

Videomatic

I read with interest Bill Klages's article "Lighting for the Video Camera" in the November issue. I'm writing to tell you and Bill, "Yes, there is a Videomatic!" Videomatic is a registered trade mark of Windsor Total Video. It relates to our method of shooting and editing test commercials or programs from slides, art work or any printed material directly to videotape in a real time situation.

Bert Saperstein
Windsor Total Video
New York, N.Y.

Our Kind of Readers

I have been a subscriber "forever" and have enjoyed AMERICAN CINEMATOGRAPHER in the past very much. I say "past" because I am not sure that I enjoy it in its present form. I think my greatest enjoyment comes from reading things that I can relate to and/or learn from. The August issue frankly was barely read although I made several attempts. The state of the art in special effects is far removed from me and although I am interested in it, I can't really say I go out of my way to read about it. Ditto the special effects articles in your October issue.

Obviously you cannot please all your readers. To find a balance that would please everyone is impossible. Rather than be too critical I decided to write the enclosed article; the kind of article that I would enjoy reading if someone else had written it. I have a feeling that your subscribers are more of a majority in the "industrial-documentary-commercial" vein than in the major studio, big-bucks vein. Not that I don't enjoy reading Alan Parker's account of his problems in his filmmaking; it's that I also appreciate/enjoy articles that more closely concern themselves with the way I make my living, i.e., lower budget hour and half-hour films of the documentary-corporate-industrial genre.

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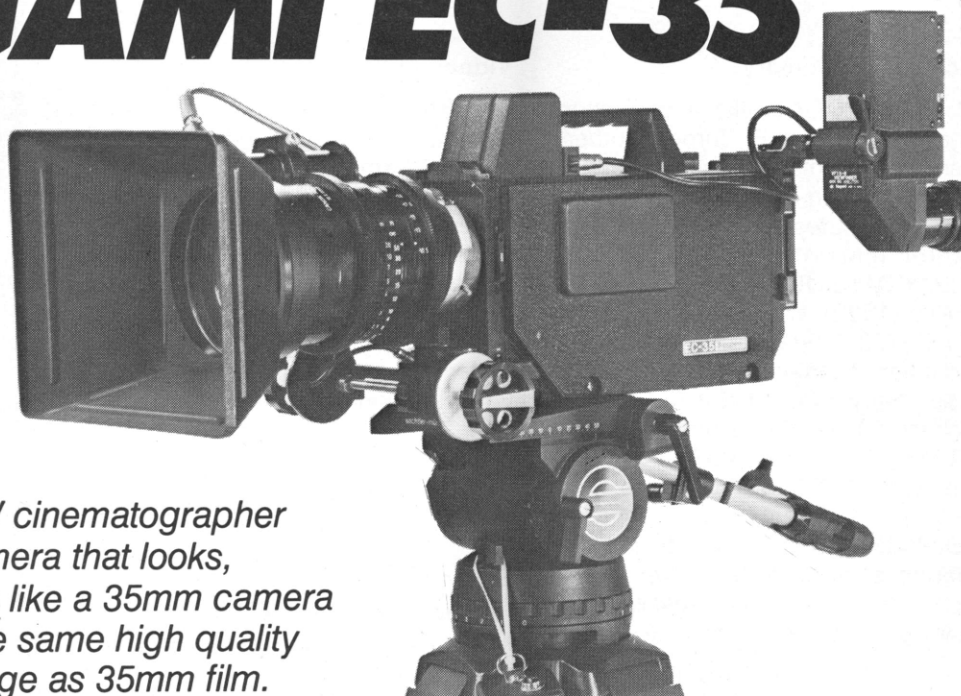
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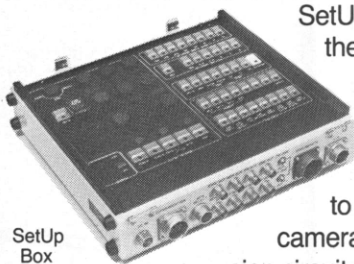
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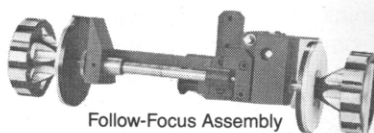
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I do sense an effort to up-grade and improve aspects of AMERICAN CINEMATOGRAPHER; perhaps your articles to which I am not too receptive in terms of special effects etc. will eventually win me over and expand my filmmaking horizons.

John Holmstrom
Los Angeles, CA

We are sure other readers will enjoy Mr. Holmstrom's article on filming auto racing when it appears in the near future.

The November issue of the magazine is in my opinion the best ever. Perhaps it is being the HAMMETT issue (and my town) or the intelligent discussions on lighting. Or is it an emerging intellectuality, a subtle shift in style and content? Whatever, it makes one want to grab a camera and make a film.

I have been saving most issues of the magazine since 1955 and the references to black and white bring things back in full cycle. I haven't forgotten any of the black and white filter technology . . . and I still have all my old K2's, G's, reds, greens, blues. Color can be beautiful, chiarascuro more expressive in other ways.

Ira Sugarman
San Francisco, CA

Film and Video

In the November issue John Graziano said in a letter that AMERICAN CINEMATOGRAPHER should stick to articles about filmmaking. Right below the magazine title it says International Journal of Film and Video Production Techniques. This clearly states that the magazine is devoted to both film and video. I wouldn't want the magazine to go totally video, but a few articles now and then won't hurt. They might even be helpful some day.

Tom Matteo
Kingston, N.Y.

Perhaps the point of my original letter has been overlooked. Since the March issue, the better part of your video articles have been written by video technicians for video technicians. Actually I do have a raw understanding of video as I'm sure many other cinematographers do, but I for one am too busy to involve myself in a deep technical study of this medium.

On page 223 of the March issue you state: "our commitment to making electronic technology more accessible to the film craftsman" and "the video content will constitute about a quarter of our expanded format" and "the articles will emphasize fundamentals rather than assuming the reader is conversant with electronics and computer technology." Well, if any of this had been truly carried out, I believe I could actually learn all I need to know by simply reading the magazine, but for the most part, the above quotes have not been realized.

The intention of my original letter was to point out my disappointment that this had, in my opinion, not occurred, and it was not to seek alternative sources of education on the subject. If there is an answer to any of this, it should come from the magazine and not another reader.

Douglas T. Polk III
San Francisco, CA

We had not intended to slough off Mr. Polk's original letter, but it is fairly clear that one man's fundamentals are another man's esoterica. Just for the record what we consider our video content has averaged about a quarter of our editorial content since March and only two or three of the pieces have been written by video technicians. While we try not to assume familiarity with electronic technology, it is difficult to know where to begin and we have to assume that our readers are familiar with a concept explained in a previous issue. We are planning to publish a special reprint issue this summer which will contain all of the video articles. If there are some fundamentals which readers feel need to be covered, we would like to know specifically what they are.

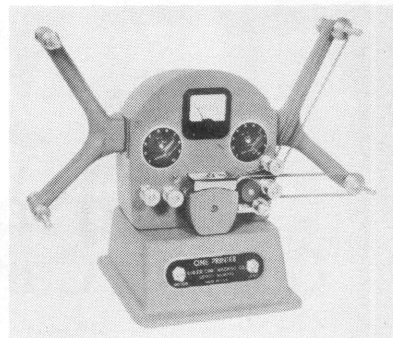
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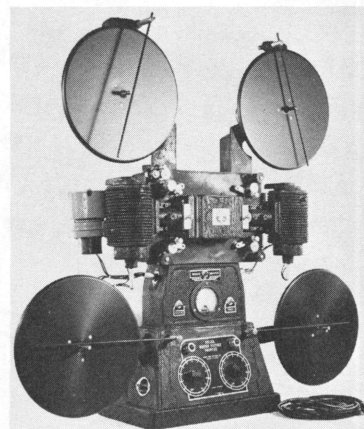
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THE BOOKSHELF

by GEORGE L. GEORGE

STUDIES IN CINEMA

An important new series of scholarly books, titled *Studies in Cinema*, being published by UMI Research Press (Box 1467, Ann Arbor, MI 48106). They investigate a cross section of cinematic concerns from advanced cinematography to the sociopolitical aspects of film adding to our understanding of the medium, its techniques and esthetics. Each well-documented volume, written by a qualified academic, provides an in-depth scrutiny based on extensive original research and a creative approach.

Among currently available volumes, let us note the following 10 titles. Sharon A. Russell's *SEMIOTICS AND LIGHTING* discusses knowledge about the innovative styles and techniques of such contemporary French cinematographers as Henri Decae, Nestor Almendros, Ghislain Cloquet; *THE WESTERN HERO IN FILM AND TELEVISION* by Rita Parks explores legend and reality in the American West; and Kathryn Kane's *VISIONS OF WAR* focuses on notable, but unduly neglected, combat films of the 40s (\$39.95 ea.).

Further, Jerome Delamater's *DANCE IN THE HOLLYWOOD MUSICAL* is a critical and historical analysis of the integration of dance and film in the works of Busby Berkeley, Gene Kelly and the Astaire-Rogers team (\$44.95). In *COMEDIAN COMEDY* Steve Seidman examines perceptively the distinguishing elements identified with Chaplin, Keaton, Lloyd, the Marx Brothers and others. In *THE BAUDELAIREAN CINEMA*, named for the French "decadent-symbolist" poet, Carol Rowe discusses the nature of American avant-garde film making (\$39.95 ea.).

Four studies of directors complete the series. *THE FILM NARRATIVES OF ALAIN RESNAIS* by Freddy Sweet and *THE FILMS OF JEAN VIGO* by William G. Simon clarify the characteristic structures of their films (\$34.95 ea.). In *JORIS IVENS, FILM MAKER* by Carlos Böker and *ROBERT BREER* by Lois Mendelson realistic documentary and modernist tradition are perceptively examined (\$39.95 ea.).

RECTIONAL STYLES

America, as seen through the eyes of foreign filmmakers, is the subject of *GREENHORNS*, an unconventional study by Norman Kaplan. His scrutiny of Antonioni's *Zabriskie Point*, Milos Forman's *Taking Off*, Schlesinger's *Midnight Cowboy*, and other films focuses on their auteurist interpretations of our lifestyles (Pierian Press \$7.95).

The flamboyant career of Preston Sturges—writer, director, producer, inventor, restaurateur and man-about-town—is narrated by James Curtis in *BETWEEN FLOPS*. It depicts a frantic, unpredictable life where success follows failure in a headlong race toward a disappointing finale (Harcourt Brace Jovanovich \$15.95).

A generously informative study by Eugene P. Walz, *FRANCOIS TRUFFAUT* examines the French director's career in a well-rounded reference guide based on personal interviews and extensive research. This comprehensive volume includes writings by and about Truffaut, bibliographical data, archival documentation and distribution sources (G.K. Hall \$35).

William Schelly's *HARRY LANGDON* is a full-length portrait of the celebrated comedian who also tried his hand at directing. Originally trained by Frank Capra, Langdon created his own memorable routines, whose visual qualities depended as heavily on plot characterizations as on acting, timing and editing (Scarecrow \$16).

THE REFERENCE SHELF

The story of movie censorship in the USA is unfolded in *BANNED FILMS* by Edward de Grazia and Roger K. Newman. This comprehensive study spells out the suppression and regulation efforts by government, the film industry itself and private groups (Bowker \$24.95/14.95).

In *HALLIWELL'S HUNDRED*, film historian Leslie Halliwell selects 100 movies as examples of the very best screenfare of the last 25 years. It evidences reliable taste and encyclopedic knowledge of the medium's history (Scribners \$25).

Critic Pauline Kael, in *5001 NIGHTS AT THE MOVIES*, reprints several thousand brief film reviews, a stimulating collection of terse, witty and informed opinions, often controversial and quirky but always on target (Holt, Reinhart Winston \$25).

The business and legal facets of film production are professionally assessed in Walter E. Hurst's *THE MOVIE INDUSTRY BOOK, PART II*. It deals concretely with corporate problems, copyright registration and litigation, contracts, tax shelters and federal securities laws (Seven Arts Press, 6253 Hollywood Blvd., Hollywood, CA 90028; \$20/10).

In *THE AMERICAN MOVIE INDUSTRY*, Gorham Kindem assembles 16 expertly written studies dealing with such areas of the industry as structural changes, marketing strategies, film regulation and censorship, and interaction with television (So. Illinois U. Press \$30/16.95).

Funding of the American film industry is documented by Janet Wasko in *MOVIES AND MONEY*, a meaningful text that traces its financing progress from early entrepreneurs through today's multinational, diversified corporations that dominate the entertainment/communications industry (Ablex, 355 Chestnut St., Norwood, NJ 07648; \$27.50).

A factual account of a quite different type of Hollywood financial mores emerges from David McClintock's *INDECENT EXPOSURE*. A real life tale of power and corruption, it follows in exacting detail the unfolding of the Begelman scandal and the corporate battle royal involving studio executives and Wall Street tycoons (Morrow \$17.50).

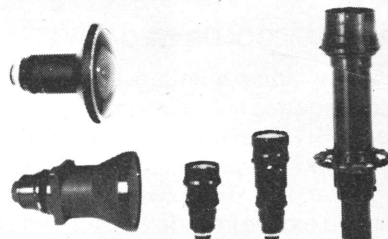
Museums' collections of film, tape and other audio-visual tools are catalogued, among their regular print materials, in *WORLD MUSEUM PUBLICATIONS 1982*. This international index of some 30,000 entries detailing the resources of over 9,500 museums is fully cross-referenced for convenient use (Bowker \$125).

A comprehensive catalog assembled by the Center for Southern Folklore, *AMERICAN FOLKLORE FILMS AND VIDEOTAPES, Vol. II*, lists and describes over 2000 entries that illustrate this country's popular culture as expressed in music, crafts, arts and oral history (Bowker \$39.95).

Film and tape shows suitable for younger viewers are listed and evaluated by Paula Rohrlack in *EXPLORING THE ARTS*. This broad selection covers some 600 programs from painting and sculpture to music, dance, poetry and film (Bowker \$24.95).

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WHAT'S NEW

IN PRODUCTS, SERVICES AND LITERATURE

EASTMAN COLOR NEGATIVE

A new family of improved Eastman color negative films was introduced at the SMPTE technical conference in New York. Eastman color high speed negative film 5294 with a recommended exposure index of 400 will replace 5293 which was rated at 250. The image quality of 5294 rated at 400 is said to be comparable to that of 5293 rated at 250. The 16mm version of the new negative 7294 has been rated at 320 and is reported to have slightly finer grain than 7293. There is also a new medium speed 16mm color negative 7291 which is rated for an EI of 100. Eastman also announced that the recommended exposure index for 5247 is being changed to 125 instead of ASA 100 due to new methods for determining recommended exposure index.

CAM-REMOTE

Matthews Studio Equipment has introduced a remote controlled pan and tilt head designed by Ernst "Bob" Nettman, a two time Academy Award winner for Scientific and Technical Achievement. The Cam-Remote allows a camera to be operated from up to 100 feet away in such a way that it can be panned or tilted continu-

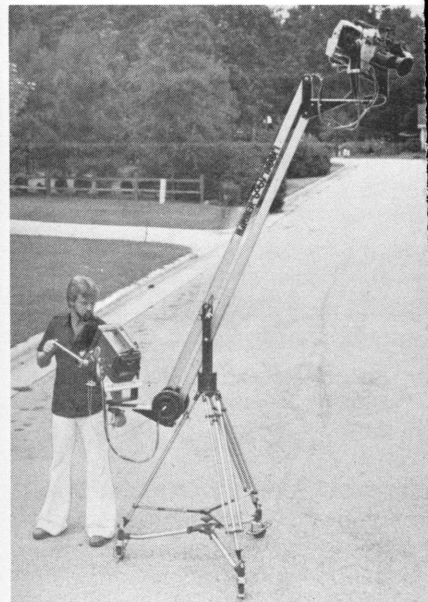
ously through 360°. Its design includes slip ring connectors which permit video cameras to be operated remotely without any degradation of the signal and without the limitation on panning or tilting caused by cables to a camera. The head is controlled by means of either a joystick, fluid head sensors or a pair of wheels comparable to those on a geared head. The panning and tilting speed is variable, and the motors on the head can be replaced with stepping motors to permit operation by computer for motion control work.

Matthews has also introduced an extension for its Tulip Crane called the Sky-Cam. Designed for use with a remotely controlled camera, the Sky-Cam can put a camera as high as 27 feet and has a horizontal reach of 18' 4". For further information about Cam-Remote or the Sky-Cam contact Matthews Studio Equipment, 2405 Empire Avenue, Burbank, CA 91504 (213) 843-6715.

BARBER BABY BOOM

Another much smaller and more portable camera boom designed for remote camera operation seen at the SMPTE equipment exhibit is the Barber Baby Boom. The boom weighs 75 pounds, can be mounted on a tripod

or dolly, and permits a camera height from 6" to 10½'. The camera can tilt up or down 90°, and pan left or right 360°. A demonstration tape for the boom includes shots made with the boom mounted in an open convertible and one shot in which the camera starts inside a parked car, booms up



Barber Baby Boom

through the sunroof and pulls back as the car drives off. For further information contact VideoTeleCom, 1305 Pratt Court, Raleigh, N.C. 27606 (919) 851-8891.

VIDEO CAMERA CASE

A lightweight protective field case for professional portable cameras has been introduced by K&H Products, makers of Porta-Brace cases. The Quick-Draw Professional, a padded nylon case with rigid reinforcement at critical points, is designed to allow immediate access to a fully assembled, ready-to-use camera (with battery attached.) Squared-out construction keeps the case solidly upright while a camera slides in or out through a top opening that can be closed either with a zipper or with velcro straps for quick release. Occupying little more space than the camera itself, the case fits easily into the trunk or back seat of a car. A seatbelt loop holds it upright in a back seat. The Quick-Draw Professional is now available for the Ikegami HL-79, the Hitachi FP 21 and 22, the Sharp XC 700, the JVC KY 2000, 2700, and the Panasonic WV 777. For further information contact K&H Products, Ltd., P.O. Box 246, North Bennington, Vermont 05257 (802) 442-9118.

Cam-Remote control desk and the Cam-Remote head mounted on the Sky Cam extension for the Tulip Crane.



LET THERE BE LIGHT

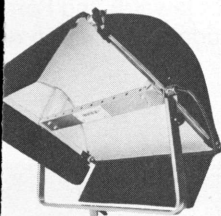
Lighting that doesn't limit your creativity.

Best lighting directors and cinematographers for film or video agree that the old axiom "If one is good, two are better" doesn't necessarily hold true in lighting. You need the right light for the right job.

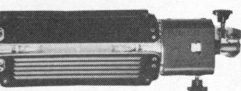
There are so many different lights and lighting manufacturers that picking that right light can sometimes be confusing. We don't want to add to your confusion, but here are a few new lights we think you should know about.



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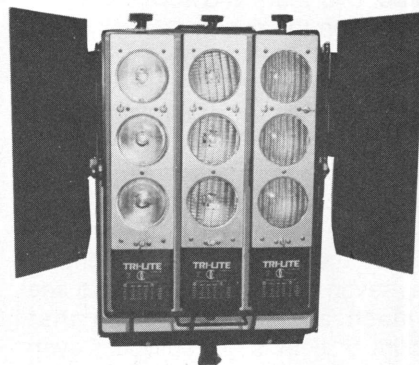


SOFTLIGHT
Features highly-reflective, heat-absorbant fabric reflector. Perfect for compact use on location.



TOTA-LIGHT
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TALKING TECHNICALLY

by D.W. SAMUELSON

Looking back on Photokina

Photokina has come and gone for another two years and now is the time to reflect on the event.

No one who has not been to a Photokina can possibly conceive how large it is. It's like a dozen SMPTE or BKSTS Exhibitions all rolled into one and covering every possible aspect of photography, cinematography and AV, plus a certain amount of T.V. thrown in for good measure. I usually spend at least seven days there and try to see as much as I can but even that amount of time is not sufficient even to walk past every stand and talk to all the friends and colleagues one meets on the way.

The professional film equipment section is mostly confined to the downstairs of Hall 13 and there are yet another twelve large halls, some

of them with upper and lower levels, cram packed with still cameras, dark-room equipment, photographic lighting, exposure meters, filmstocks, amateur cine, picture frames and albums, A.V. projectors, filters, lenses, photographic books, equipment cases, professional processing machines, film editing equipment, tripods and dollies and so on. Miles of gangways and hundreds of stands, are interspersed with buffet counters selling the most delicious German knackwurst.

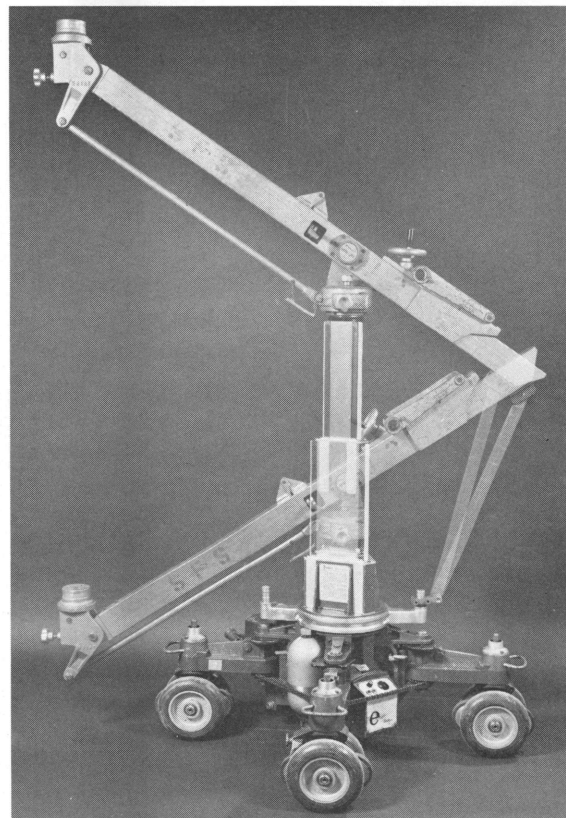
A benchmark item that we will recall as having been at its first Photokina in 1982 must go to Stefan Kudelski's video Nagra, the Ampex-Nagra VPR5. The new Nagra video recorder was first shown at the IBC professional T.V. equipment in Brighton about two weeks before

Photokina and was also the sensation of that show. There one could hardly get near the Ampex stand for all the Japanese gentlemen crowding around the exhibit from Switzerland.

For the record, and especially for those who have to carry video recorders around, the Ampex Nagra weighs less than 15 lbs. Including battery and a 20 minute reel of tape, it can take a hour tape with somewhat less portability. It is only 17½" wide x 8½" front to back and 5½" deep, the batteries last one hour or it can be run on any a.c. supply or a vehicle battery, is available in an NTSC/60 or PAL SECAM 625/50 C-format modes and it has three audio channels or two audio channels and a time code generator, if preferred.

It's like a piece of jewelry and I predict that Stefan Kudelski will soon do

(RIGHT) Elemack Cricket with regular mini jib and "home made" link arm showing how the jib can be made to rise and fall 4 feet in shot. (LEFT) Steenbeck 8 plate dual screen editing table with SMPTE time code and other state of the art electronic accessories.





Merl Dobry takes off again...

with Cinema Products custom-designed camera mount and GSMO.

Hit head-on by the landing gear of a fast-descending stunt plane he was filming, Merl Dobry got knocked off his camera car. Regaining consciousness three and a half weeks later, the famous aerial cinematographer, sky-diver, underwater and stunt cameraman found himself with his right shoulder and arm shattered with some 20-odd compound fractures and major damage to arteries and nerves.

Undaunted by the near-fatal crash, three years of reconstructive surgery and physical rehabilitation—and despite the resultant permanent paralysis in his right shoulder and arm—Dobry was determined to use his reborn skills and get back into production.

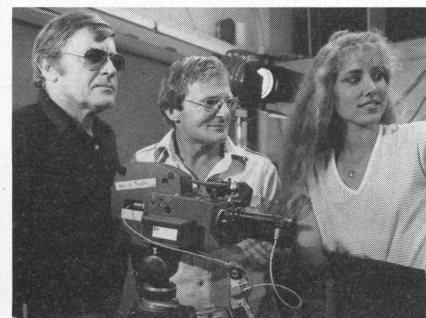
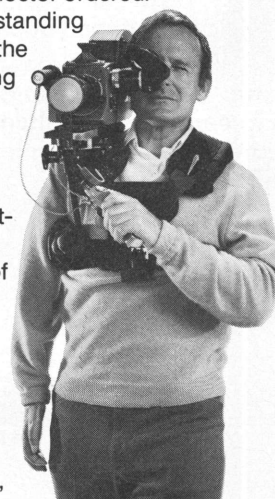
"My main problem, though, was how to use standard camera equipment which is basically designed for two-handed operation," says Dobry, whose production company is based in Santa Barbara, California. "Enter Cinema Products and GSMO.

"GSMO, of course, was the obvious choice. Not only is it the most lightweight professional 16mm production camera around, it also features crystal-controlled variable speeds from

12-64 fps (including an optional 30 fps speed), integral auto slating and pilotone outputs, and a choice of quick-change cassette-load magazines—the standard 400' magazine as well as the new, low-profile, ultra-lightweight 100' magazine. A most versatile 16mm production camera for a wide range of applications. In short, just what the doctor ordered.

"Moreover, Cinema Products' outstanding engineering team was willing to go the extra mile on my behalf. Constructing a custom-designed GSMO mount (patterned after the Steadicam® operator's vest), with J-5 handgrip power zoom and camera start/stop control adjustable for convenient left-handed operation. Comfortable and functional to the last detail. In case of emergency, I just pull on the rip cord . . . and I'm free of camera and mount in seconds!

"Thanks to Cinema Products, sporting my best 'designer suit' and GSMO, I'm back in the swing again. Working on commercials and documentaries. Flying and filming again."



Merl Dobry (center) lines up the next shot for a Weinmann ski boots commercial, produced for the Robert Hammond agency (Santa Barbara), as creative director Bob Hammond and model look on.

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or location video recording what he did for audio recording two decades ago.

At the other end of the scale, my prize for the simplest, yet cleverest invention goes to Sante Zelli of Eletrack for a link arm which connects the back of his new mini-jib arm, called by yet another insect name, the Cricketspota, to the spigot on the Cricket dolly which normally supports the operators' seat. Anyone can do the same thing with an old type mini-jib and a Cricket dolly just using a length of rope. All you have to do is tie a length of rope between the back of the jib arm and the base of the dolly and then as you operate the column up and down it will push on the jib arm and raise and lower the camera by your feet, from very low to very high. It is not, of course, necessary to use counter-weights on the jib arm.

The revolution in equipment that is now just a rumble but which will, I am sure, become a roar, is what is happening to editing machines. Cine-Monta, Kem and Steenbeck all showed flat top editing machines which peek into the future of film post-production.

They all interface with video cameras of any quality you wish to choose and can be used to make a very reasonable quality video to film to transfer onto U-matic, Betamax or V.H.S. from negative or positive film with a minimum of film handling. It means you can see what an assembly will look like before making a print, take a cassette to show where it would be difficult to take an editing machine or film projector, look at a trial edit before putting the scissors in, edit picture on video tape while keeping the sound on film and so on.

Steenbeck showed an eight plate bin which displays two pictures on slide by side screens, so that you can see a scene from two camera angles, decide on the cut and instantly transfer to video to see what it looks like joined together even before cutting the film. The same machine also incorporated a small thermal print-out machine which can log such details as the edge number, the time code reference, the scene number, the footage, the screen time and any other information you desire to put there. It can even produce a sticky label which can be stuck on the end of a piece of film when it is hanging up in the bin or a larger label to stick on the film can.

There are editing machines now

that have one, two or three recording quality sound heads, where you can transfer directly off the Nagra 1/4" pulsed tape onto sprocketed film and put a time code on. They can be used to transfer sound from library tracks and to lay tracks and do pre-mixes preparatory to going into the dubbing theatre.

Another trick that Steenbeck showed was a machine which incorporates variable speed control which corrects the pitch of the sound irrespective of how fast or how slow (within limits) the machine is running, so whether you are running at 10 or 60 r.p.s. speech still sounds intelligible.

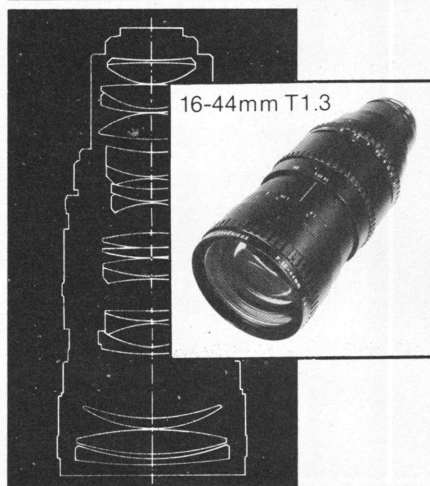
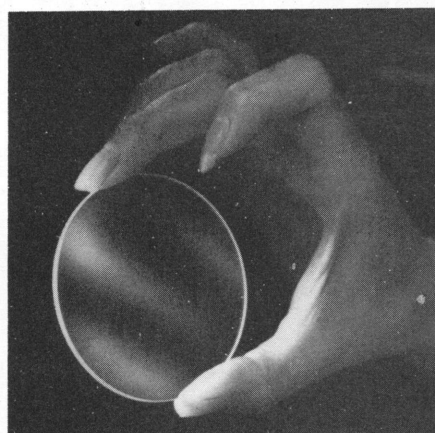
Time codes are everywhere, of course, and all of us who have learned and so far stuck to the traditional way of film making will have to get into an educational thing to learn what is now possible and what can be done to speed that process without losing any of the creative input, and with the advent of the Eastman Kodak Magnetic Control Surface Technology now called Datacode it truly will be a worthwhile revolution for all those who wish to avail themselves of it.

Browsing through the Bell & Howell stand I was interested to note that they now make a retrofit kit to modify some of their existing high speed optical step printers to provide Automatic Panning when making unsqueezed 35 and 16mm copies from 35mm anamorphic originals, a practice which has long been the norm in broadcast standard film to tape transfer. Hopefully the films from anamorphic originals we see on aircraft these days will be less truncated than heretofore.

Exciting though all the many new items and improvements to the existing equipment are, one must never fail to take a perspective look at an exhibition like Photokina. As a former head of the BBC once said "There are many exciting new technological innovations that may never happen."

Just because something new is shown at Photokina doesn't mean to say that everyone will be using it all right away or that some mainstream films won't continue to be made on ancient equipment held together by camera tape, or that all that is new and worthwhile is even shown at Photokina, or, for that matter, that new equipment really has any bearing on whether or not people go to the cinema, watch T.V. or select a particular cable channel.

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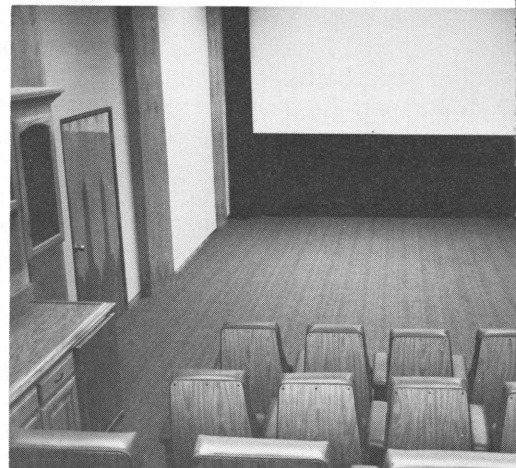
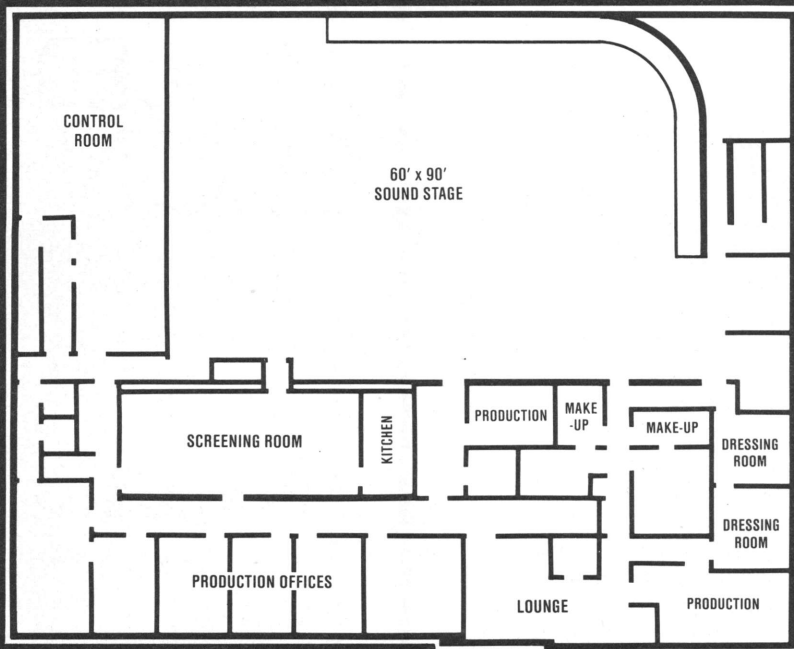
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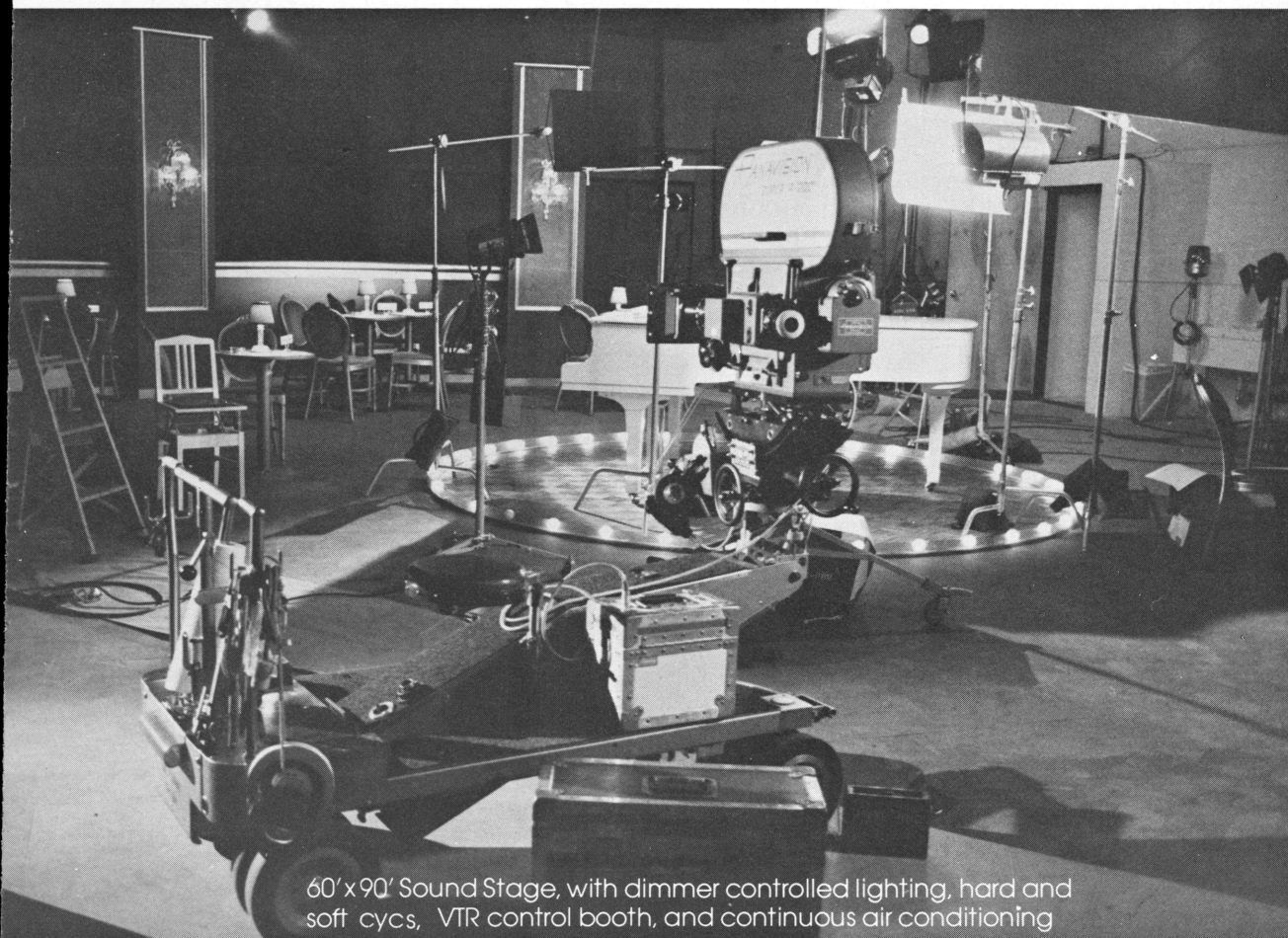
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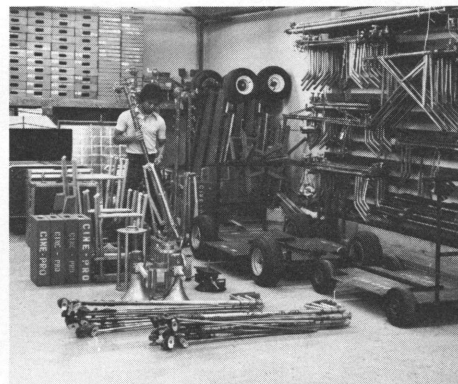
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VIDEOTAPE STORAGE

How to Make Your Videotapes Last for Decades ... or Centuries

by JIM WHEELER

In recent years there has been a dramatic increase in the use of videotape recorders as well as an increase in the quality of videotape. The quality of the TV recorded image itself has not improved much because videotape recorders are designed for the U.S. Television (NTSC) which is not a high resolution system. High resolution videotape recorders, in various forms, have been used experimentally in laboratories for several years, but they have not been made available commercially. This is because there has been no indication that the market would justify the development expense. The recent interest shown in High Definition Television (HDTV) by the TV industry may be the catalyst needed to entice the video equipment manufacturers to build the special high resolution equipment required by filmmakers, particularly if filmmakers also show more interest in using high-resolution videotape equipment.

VIDEOTAPE QUALITY

Videotape quality has come a long way since Ampex introduced the first videotape recorder in 1956. In the early days, there were problems with oxide-shed. By 1970, Ampex, 3M, and Memorex had developed reliable techniques for binding the oxide to the polyester base film. There is no oxide-shed on recent products except for that directly caused by improper handling or storage of the tape. Thus, knowledge of proper storage and handling techniques is imperative.

There have been several recent studies and reports about the stability and longevity of magnetic tape. These technical studies have been summarized in relatively non-technical language in a forthcoming issue of the Society for Motion Pictures and Television Engineers (SMPTE) Jour-

nal. The article is entitled, "The Long-Term Storage of Videotape."

Some people have expressed concern regarding the longevity of videotape. When examined closely, however, the factors they fear do not turn out to be problems at all.

Color Stability: A color picture is stored on tape on a single coating of magnetic particles. These particles do not change with time, therefore the color quality of the image will not change. Also, videotape is not affected by light.

Magnetic Stability: The magnetic strength (coercivity) of videotape has doubled over the past ten years. The stronger magnetics make the tape very difficult to erase except with spe-

*A properly stored
videotape should last for
hundreds of years.*

cially designed erase heads. As long as the tape is kept about half an inch or so from any large magnetic field (such as a motor), there is no possibility that the tape will be erased. It takes a field of about 150 gauss to have any noticeable effect on the recording. 150 gauss is an extremely large magnetic field. It is doubtful that fields over about 10–20 gauss will be encountered in normal environments.

Oxide Stability: The video heads on a videotape recorder are carefully designed to glide over the tape surface without harming the tape. This writer has used ordinary heads, tape, and videotape recorder and still framed the same picture on the tape for 9 hours with no noticeable degradation. This means that the magnetic tape head passed over the same

piece of tape more than two million times. Unnecessary use is not recommended for master or archival tape. It is a good practice to use these tapes as little possible so there is minimum possibility for damage.

X-rays: There is some fear that tape will be "exposed" by airport security devices. There is no ground to this fear because X-rays *cannot* affect magnetics. There is, however, a potential problem with the hand-held magnetometers used for a body search. These can erase tape, so do not carry videotapes on your person.

Longevity: A properly stored videotape should last for hundreds of years. The only known cause of deterioration would be a hot or moist environment—such an environment can cause the binder to break down.

Water and Heat: Heat and moisture are bad for tapes as well as for film, but it is surprising how much heat and moisture tape can tolerate, as the result of a disaster, and still have acceptable playback. Tape that has been soaked in water for hours or even days can be dried and played back with very little (or no) noticeable degradation and tape can withstand 150°F temperature for several hours with very little (or no) noticeable degradation. If a tape has been subjected to extreme heat (like 150°F+) or water, it should be duplicated, because its long-term stability would be questionable.

TAPE STORAGE FACILITIES

Operators of professional videotape recorders have been trained on how to keep the recorder clean and how to handle the videotape but proper storage of videotape was not understood until recently. Assuming that the tape to be stored has been properly recorded on a properly maintained VTR, the master tape is then

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TM Magazine TM Seminars

Our June 1982 issue was devoted to the HDTV development and the creative use of sound in recent Hollywood films.

TM Magazine ("Technology & Man")

is published five times a year by The Swedish Film Institute in cooperation with The Swedish Broadcasting Corporation, The Danish Film Institute, The Finnish Film Foundation and The Norwegian Cinema and Film Foundation.

It is the leading trade magazine in the Scandinavian film, video and broadcasting industry, and has gained international reputation for its intelligent columns on new media technology and its applications. TM MAGAZINE represents a »hot-line» to decision-makers, producers, directors, cinematographers and engineers in the Scandinavian visual media industry. Although it is published in the »language of the Vikings» we frequently publish advertisements in English.

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Chief Editor—Director of Photography F.S.F.—F.BKSTS

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ready to be stored for several years. There are basically three levels of care for storing videotape:

Archival: Each reel of tape stored upright in a temperature- and humidity controlled room. Humidity should be 34–45% RH and temperature should be in the low sixties. Each reel is wound on a special tape wind before it is stored and again when it is removed from storage. (This equalizes the tension stress in the tape pack). Every 3 to 10 years, each reel is wound end-to-end to relieve built-up stresses. Ten years should be satisfactory for back-coated tape, but three years is preferred by people who want that extra margin of safety.

Studio: Temperature and humidity are not rigidly controlled, but neither should be allowed to go too high. A wine-cellar with a de-humidifier would work just fine. If a special tape wind is not used, the VTR should be checked to be sure that it rewinds the tape at the proper tension. If studio tapes are allowed to go ten years before being used, they should first be played through to the end. The tape should not be shuttled at high speed on the first pass because of the possibility of the pack slipping and causing fold creases in the tape.

Home: An uncontrolled environment is not recommended, but that does not mean that tapes stored in this manner will automatically deteriorate. This writer has audio tapes that have been stored thirty years this way and they still sound good.

BASIC RULES

Any high density recording medium will deteriorate in quality if it is not handled and stored properly. No matter which level of tape storage is used, the following basic rules should be followed.

1. The VTR used to record and wind the videotape must be properly maintained.
2. Before storing the videotape wind it end-to-end in the same environment it is to be stored in.
3. Place the tape in a dry environment for a day or two before sealing it in a quick-seal plastic bag.
4. Store the tape in a room which has very little temperature and humidity variation.
5. Store the tape on steel shelves in a room with no combustibles.

Jim Wheeler is a senior engineer with Ampex Corporation.

UNDERWATER VIDEO

by BILL DONALD



Location video production is nothing new. But when the location is 30 to 80 feet underwater, video production takes on a few new twists for even the most experienced land-based videographer.

First, the camera, equipped with a wide-angle lens, must be kept in a watertight housing. The housing must keep the camera dry and still provide the cameraman with the same use of the viewfinder and the same mobility available on land. Next, the camera is connected to the videodeck with 250 feet of coaxial cable. The cable is connected at both ends with special marine connectors that prevent the cable from flooding. The cameraman's modified mask is equipped with a waterproof microphone and earpiece. This allows two-way communication, via hardwire, between the videodeck operator and the cameraman. The communications and video cables are tied together and tended by a utility diver.

Safety is very important on underwater locations. A complete checkout of both the diving and video gear is done before each dive. The depth and time of each shooting dive is planned out by the dive master and cameraman. Underwater, the divemaster makes sure everyone follows the dive plan and provides back-up assistance to the cameraman should an emergency situation develop.

Shooting begins with a scouting dive by the dive master and video operator. A location area is picked and

Shooting in the coral reefs off Bonaire, Netherland Antilles, a crew from Yellow Cat Productions of Silver Spring, Maryland, uses a JVC KY-2000 in a SeaCam underwater housing built especially for the camera.

the dive boat moored nearby. A shooting sequence is developed and written out on underwater slates. After a final equipment check, the cameraman and divers swim down to the location. All shooting is done in this circle of action. Marine life is brought to the camera by divers. This method is much easier than trying to chase the fish. Tracking shots, deep water shots, and specific reef shots are accomplished by snorkeling out over the location and diving down to the reef. The cable is laid out along the reef. Tracking shots are done along the cable so the assistant can just pick it up as the cameraman swims by.

The most dynamic aspect of underwater video is the new dimension and mobility available to the cameraman. Normal camera movements, like tilt, pan, swim in, and swim out, are performed easily since the camera and operator are weightless. The new camera techniques are added when the cameraman shoots while floating up twenty feet, swimming over the talent and then floating down 30 feet and into a low angle shot. Video movement becomes three-dimensional.

Lighting has a new twist to it, too. Natural sunlight proved to be ade-

quate down to about thirty feet. Below that, one or two divers handled a set of three modified aircraft landing lights. The lights, powered by boat batteries on the surface, were used primarily as supplemental lighting since there was never much need to light an entire reef area.

Wildtrack audio is recorded by submerging a cheap microphone straight into the water. The mike is kept in a bucket of water when not in use. At the end of the shoot, the mike dries, gets rusty and is thrown away. Diver/videodeck operator communication is also recorded on a separate track.

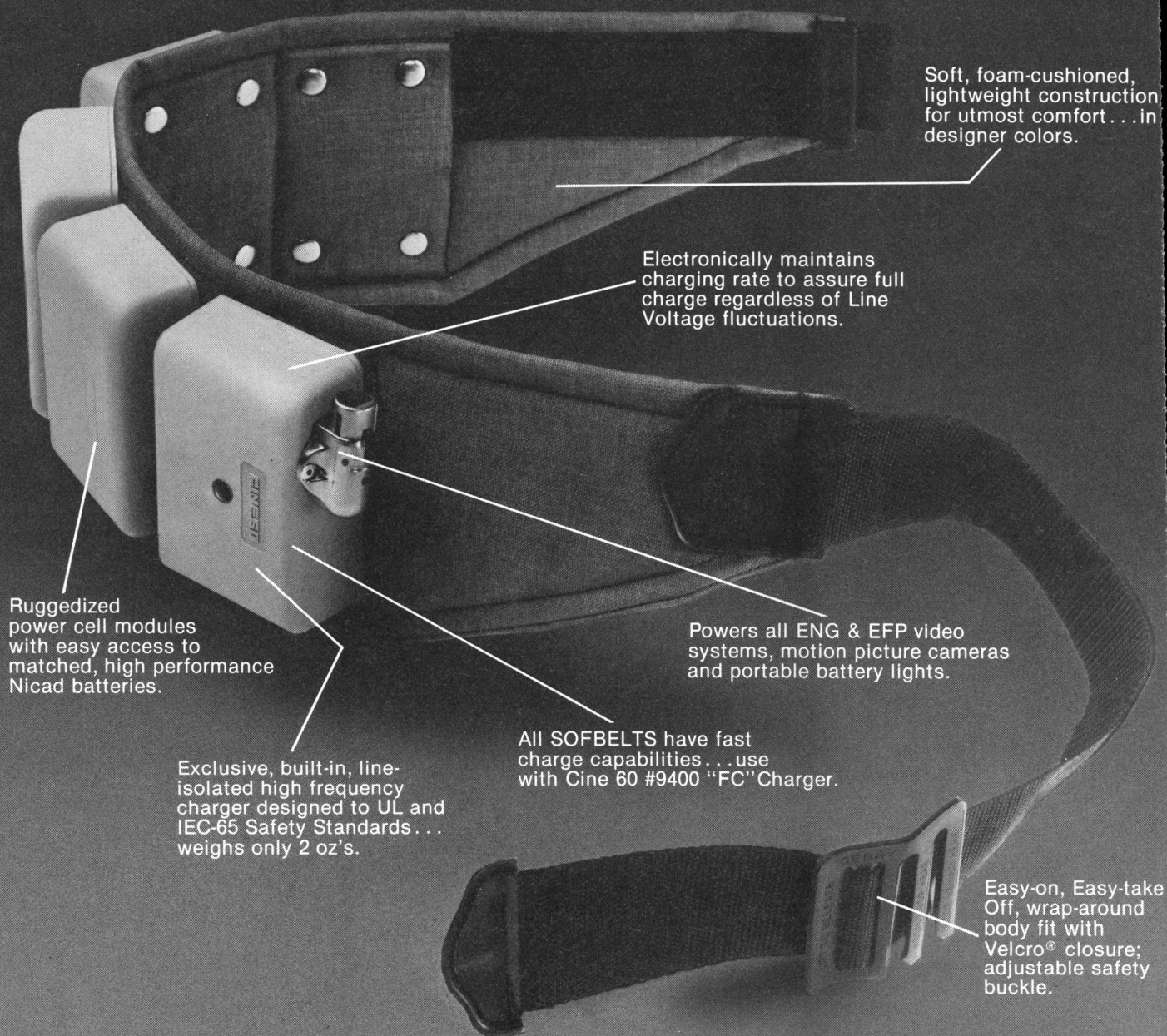
All these new techniques require a slightly larger crew than is usually found in land based video. Divers include the cameraman, lighting technician, one or two cable tenders and a utility diver. This doesn't include whatever models might be needed. On the surface, the videodeck operator monitors the picture.

Underwater video is a relatively new technology and presents some distinct advantages over underwater film. Primarily, these are cost and running time. Videotape costs much less than film and can be reused. The cameraman is not limited to the amount of film in one magazine, the video operator simply changes the tape while the divers wait underwater. Video appears to have a greater light sensitivity than film; this, along with automatic white balance, and immediate playback gives video a leading edge in underwater environments. ■

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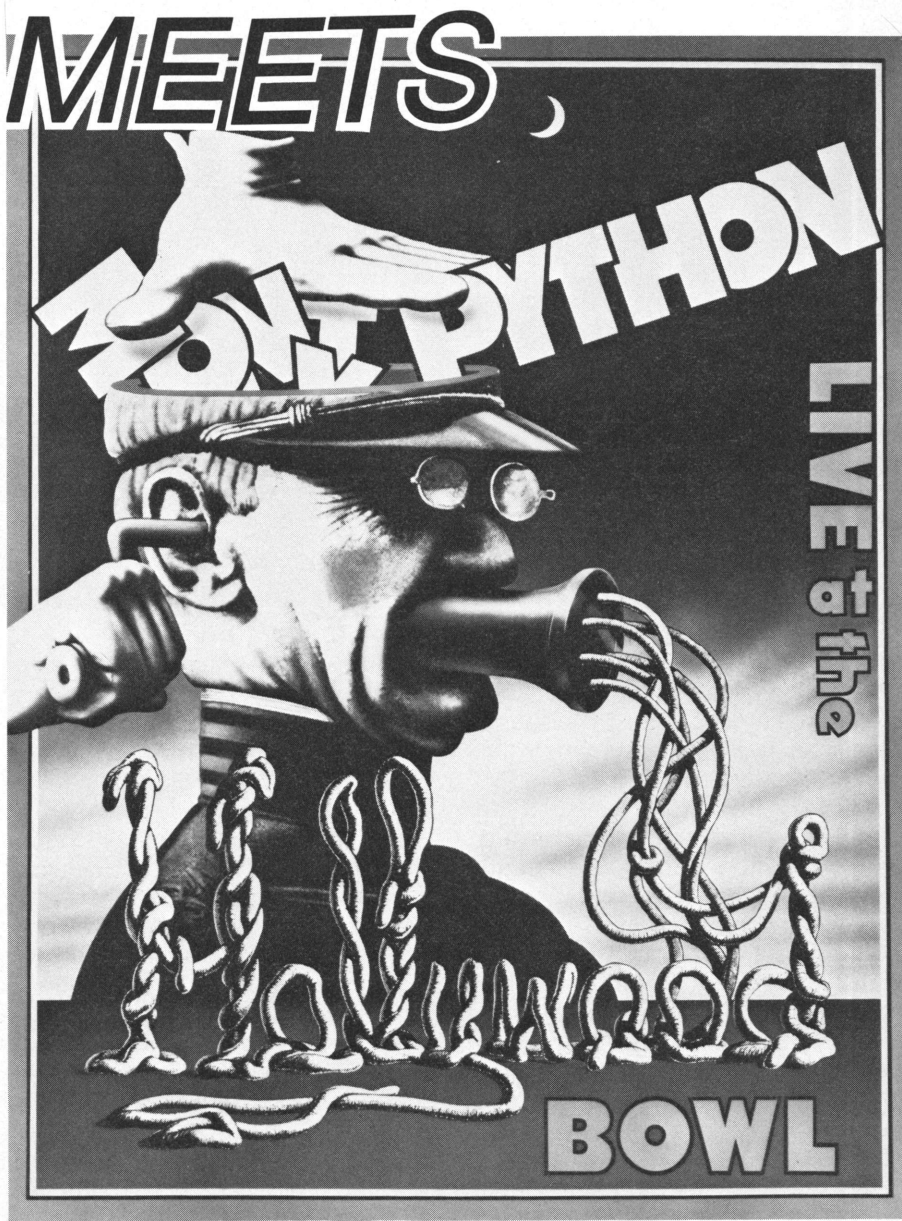
IMAGEVISION

ImageVision

ImageVision is a system for increasing the resolution of a television image by means of modifications to existing equipment. While it does not represent as great an increase in resolution as the 1125 line high definition television system developed by NHK and Sony, it has the advantage of being practical now in certain applications and of using equipment which is commercially available rather than a prototype. The modifications required for the cameras and recorders are such that the equipment can be easily converted back and forth between ImageVision and the standard NTSC format.

The key to ImageVision is the fact that most state-of-the-art video cameras, switchers, and recorders are capable of performance or resolution which far exceeds the limits of the NTSC standard method of broadcasting a television signal. The resolution of an NTSC color video image is limited by the frequency range or bandwidth which can be transmitted within a given "channel" of the broadcast spectrum. It is also limited by the way in which the color information is combined with the black and white image, i.e., the way in which the "chrominance" is

Continued on page 95



by LEE GREGORY

"If you're going to do things that are innovative—connect two experiences together—you can't go after the same bag of experiences that everyone else does or you're going to make the same connections everyone else does and you're not going to be innovative."

—Steven Jobs, Board Chairman, Apple Computer, Inc

Jobs' remark was made only recently to the annual banquet of the American Academy of Achievement, but it serves to describe the perform-

ances with which the English comedy team Monty Python has been winning and keeping fans for years. It also describes the process through which MONTY PYTHON LIVE AT THE HOLLYWOOD BOWL was brought to the screen; namely, a live, outdoor performance, recorded on videotape and transferred to film for final editing and distribution.

There is a second reason a computer manufacturer's comments are relevant to this project: Very little of it could have been realized without the computer-assisted editing techniques and other forms of "magic" (by the standards of a few years ago) which the silicon chip is bringing to so many

Eric Idle





Relaxing (?) at the Hollywood Bowl are writer-performers Michael Palin, Terry Jones, Eric Idle, Graham Chapman, Terry Gilliam and John Cleese.

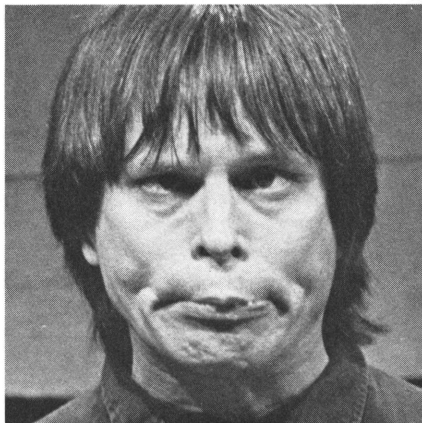
aspects of motion picture production.

The project began to take shape more than two years ago when the Pythons booked a concert date at the Hollywood Bowl for late summer 1980. They decided they wanted some sort of record of the event, which was to be a compilation of much of their most popular material. Originally, there was no firm commitment to produce a theatrical-release motion picture, and so videotape was settled on for reasons of economy. At the same time, no one wanted to eliminate any options, either. Thus the decision to shoot the concert in ImageVision.

The brainchild of Compact Video Systems and Image Transform, Inc., ImageVision is a high-definition, wide-band television system which uses 655 scan lines per frame recorded at a rate of 24 frames per second. Standard NTSC recording, of course, is done with 525 lines per frame at 30 fps. For purposes of the Python project, the format was also "squeezed" vertically, which had the effect of putting the 655 lines into a smaller area, and further increasing resolution. (The film has been released in a format of roughly 1.85 to 1.) The final product does not have the definition of a picture originated on 35mm film—the people at Image will tell you that. But it is close. While the release print quality is not sufficient to fool the eye of a professional accustomed to

the information storage capacity of 35mm film, there is nothing displeasing enough to leave a negative impression with a typical film goer. Moreover, the print quality is not as high as it could be because of the method the Pythons used to fine cut the film, but more on that later.

ImageVision is best explained by one of the men who created it. Ken Holland is president of Image Transform, Inc., in North Hollywood. The firm has long been known for its patented videotape-to-film transfer techniques; themselves industry standards. Holland, now very involved at Image Transform was with Compact Video until that firm acquired Image Transform. He divides an explanation of the process into



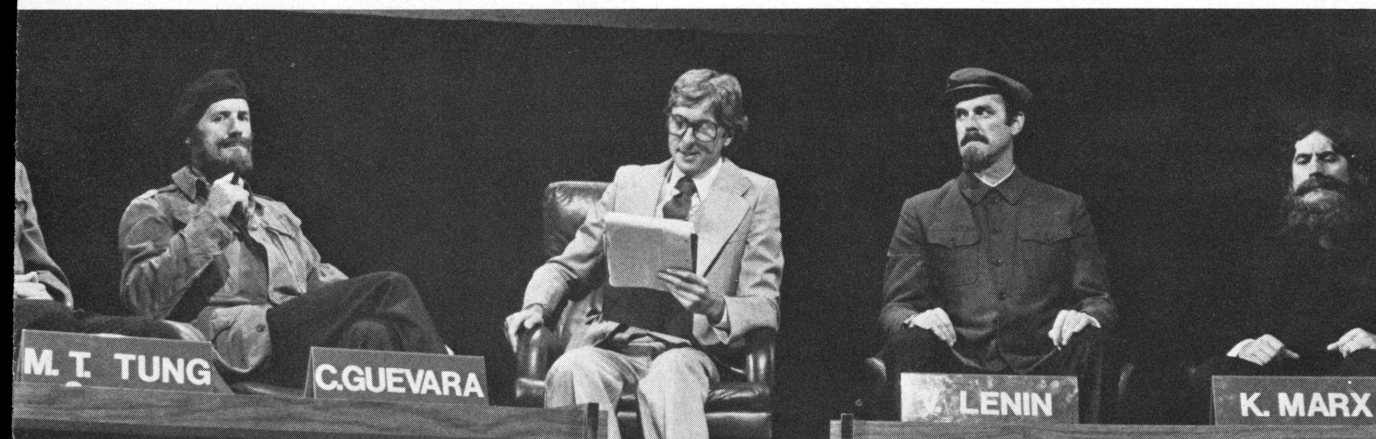
Terry Gilliam

two parts—the conversion from 525 line/30 frame format to 655 line/24 frame; and P.A.L.A.F., or the phase alternate line alternate frame color coding system. It is this electronic "black box" which is the heart of ImageVision.

One of the goals of high-definition television systems is obviously large-screen television projection. Most projectors in use today are consumer models with relatively low quality—they are not capable of displaying high-definition pictures.

That point pertains particularly with regard to the Hollywood Bowl concert. Given the nature of their comedy, which has always been designed for and to some extent dependent on close-up work, they were concerned that it would be possible for the show to be literally "swallowed up" in an environment as vast as the Bowl. ImageVision offered a way to bring close-ups to a live audience. Thus, two 40 by 60 ft. Eidophor TV projection screens would give that aspect of the performance to the audience. The concert was switched live to the audience on the screens. On the two nights the performance was recorded, each of five cameras was isolated to its own Ampex AVR 2.

Remember that the ImageVision system is useful with 525-line/30 fps recording as well as the special 655-line/24 frame format. A double-wide signal path helps NTSC signals come



rough with lower information loss and greater definition, too. Increasing the picture from 525 lines to 655 is a separate process which further enhances the recorded product.

The ImageVision process dates back roughly to late 1978 or early 1979. According to Don Nikkinen, director of tape-to-film and laboratory operations for Image Transform, ImageVision is about 20 percent more expensive than the firm's "normal" tape-to-film transfer process. Essentially, technicians must modify the equipment all the way through the transformation process to pass the wider bandwidth. According to Don, it's not a total technological "snap" as yet. There are a few pieces of gear that are still being worked on.

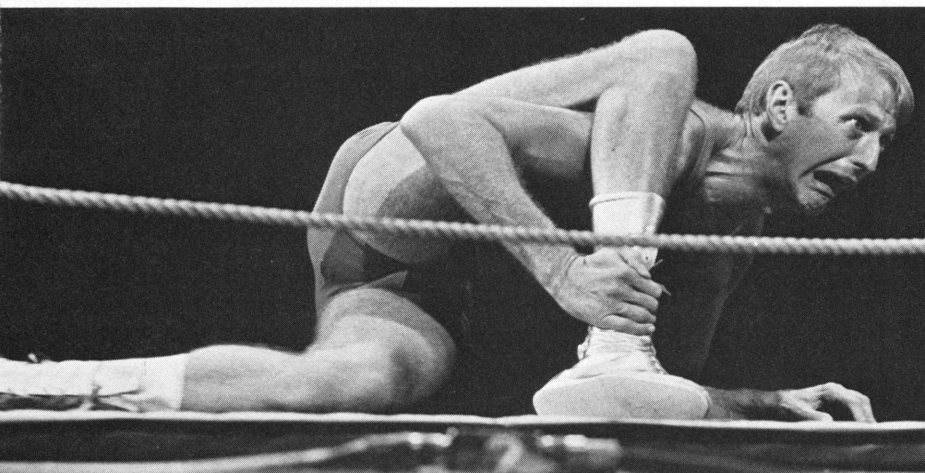
ImageVision, he says, is not a panacea or cure-all. Its use requires shooting original with the wideband-modified equipment. An ImageVision tape-to-film transfer of standard videotape would serve no purpose. The wide bandwidth must be there at the record stage, or there is nothing "extra" there to "pass," or work with. In the case of the Python project, even more resolution is obtained because 655 lines are used instead of 525, and

(ABOVE) Terry Gilliam (Mao Tse Tung), Michael Palin (Che Guevara), Eric Idle (game show host), John Cleese (Vladimir Lenin) and Terry Jones (Karl Marx) in one of the less maniacal moments of the show. (RIGHT) Terry Jones as a frumpy homemaker. (BELOW) Graham Chapman as Colin "Bomber" Harris, self-wrestler.

those 655 are being replayed in a "squeezed" format instead of onto a standard 3x4 television screen. This means that the scan lines are being squeezed into a narrower area, the film printed as a flat negative, (non-anamorphic) and then projected with mattes blocking off the top and bottom of the 35mm projection aperture. The result is a "denser" television picture going in to the transformation-to-film process.

How good is ImageVision? Don says if you want to work with video equipment which exists today in something other than prototype form, it's the best system available if the mission is to shoot tape and deliver film. It is not the equal of 35mm, however. As he puts it, ImageVision approaches 35mm quality, but does not equal it. He feels that from Image

Continued on page 97





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transfer, the **Aaton Adage 4 Fullcoat Printer** reads the code data and dry-prints this information as visual edge numbers onto the base of the fullcoat magnetic film. Any number of cameras and recorders, starting and stopping on their own, may now be edited in perfect sync without the need for slates or blooplights.

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Inside the KHMER ROUGE



On April 17, 1975, the Army of the Khmer Rouge marched victoriously into Phnom Penh, the capitol of Cambodia. Their arrival marked the end of a bitter civil war between the outlawed Chinese-backed Khmer Rouge and the U.S. installed regime of right wing general Lon Nol. Within hours the Khmer Rouge, led by Premier Pol Pot, Vice-Premier Khieu Samphan, and Foreign Minister Ieng Sary began implementing the most radical communist revolution in world history. Their dream was to make Democratic Kampuchea (their new name for Cambodia) into an absolutely independent, self sufficient, agrarian society. To do so, they invoked "The Spirit of the Angka," the ancient Khmer "super race" that created the temple-city complex of Angkor Wat.

Cambodia is a land of steep mountains, thick jungles, and huge rice field plains. For the next 3½ years "The Angka" ruled the six million inhabitants of this former story-book kingdom with absolute authority. In the course of it, hundreds of thousands, if not millions of their countrymen died from disease, starvation, and execution.

By May of 1975, all foreigners, including journalists had been evicted from Democratic Kampuchea. The news blackout was total and held until, and even after the Vietnamese invasion in 1979. Those few western journalists who ventured to slip into Democratic Kampuchea between 1975 and 1979 were never heard from again. The only news reaching the Western world came from refugees who had crossed into Thailand, and from the Vietnamese press agency. The refugees told of mass executions and of the horrors of huge labor camps controlled by the Khmer Rouge Army. In the camps, old men were harnessed to plow the fields and worked until their starving bodies collapsed. Suspected traitors were bludgeoned to death with ax handles in an effort to save bullets. The Vietnamese did their best to exploit these stories. They did so, at least in part, to provide moral justification for their ultimate "liberation" of Cambodia.

In December of 1978 Viet Nam launched a massive invasion against their neighbors to the West. Although the Viet Cong and the Khmer Rouge had been allied in their earlier battles



*Justin Ackerman, Denis Reichle
and Buddy Squires in Western
Cambodia.*

against the Americans, and indeed a number of Khmer Rouge cadres had been trained in Hanoi, by 1978 the two were bitter enemies. Hanoi was suspicious of the renegade Pol Pot and envious of the abundant fertile plains and the great lake Tonle Sap that make up much of central Cambodia. For their part, the Khmer Rouge were deeply distrustful of the long term aims of the 50 million Vietnamese whose border lay a mere 35 miles from Phnom Penh. More than once the Khmer people have found themselves under foreign domination and they remember well the implied threat of Ho Chi Minh's "Indochinese Federation;" a 1959 proposal that called for the union of Viet Nam, Laos, and Cambodia under Hanoi's guiding spirit. Adding to the enmity is an ethnic, almost racial hatred between the Khmers and the Vietnamese that dates back thousands of years.

Within three weeks of the start of their offensive the Vietnamese army was in solid control of Phnom Penh. They pursued the Khmer Rouge to the mountains near the Thai border where the Khmers dug in for a final stand and where most of their troops remain to this day. The fighting

touched off a tidal wave of refugees. Some 1.2 million sick, starving, and war weary refugees crossed into Thailand in desperate hopes of sanctuary.

THE FILM

Producer/Director Justin Ackerman had been following these events with great interest. Ackerman was disturbed by the simplicity with which the Cambodian wars had been reported in the west. From reading the papers, one would suppose that Pol Pot's revolution had brought about the Asian bloodbath that western politicians had long been predicting.

Ackerman decided to travel to Western Cambodia in order to examine the remains of the revolution firsthand. No westerner had ever filmed deep inside of Democratic Kampuchea. He sought to create a feature documentary film immersed in the mythology of the Khmer Rouge and the reality of living "Beneath the Angka."

I first met Ackerman in N.Y. where I was working on BROOKLYN BRIDGE, a film by Ken Burns that was produced by Florentine Films. Ackerman's plans to shoot a film in Cambodia coincided well with my own long standing interest in working with

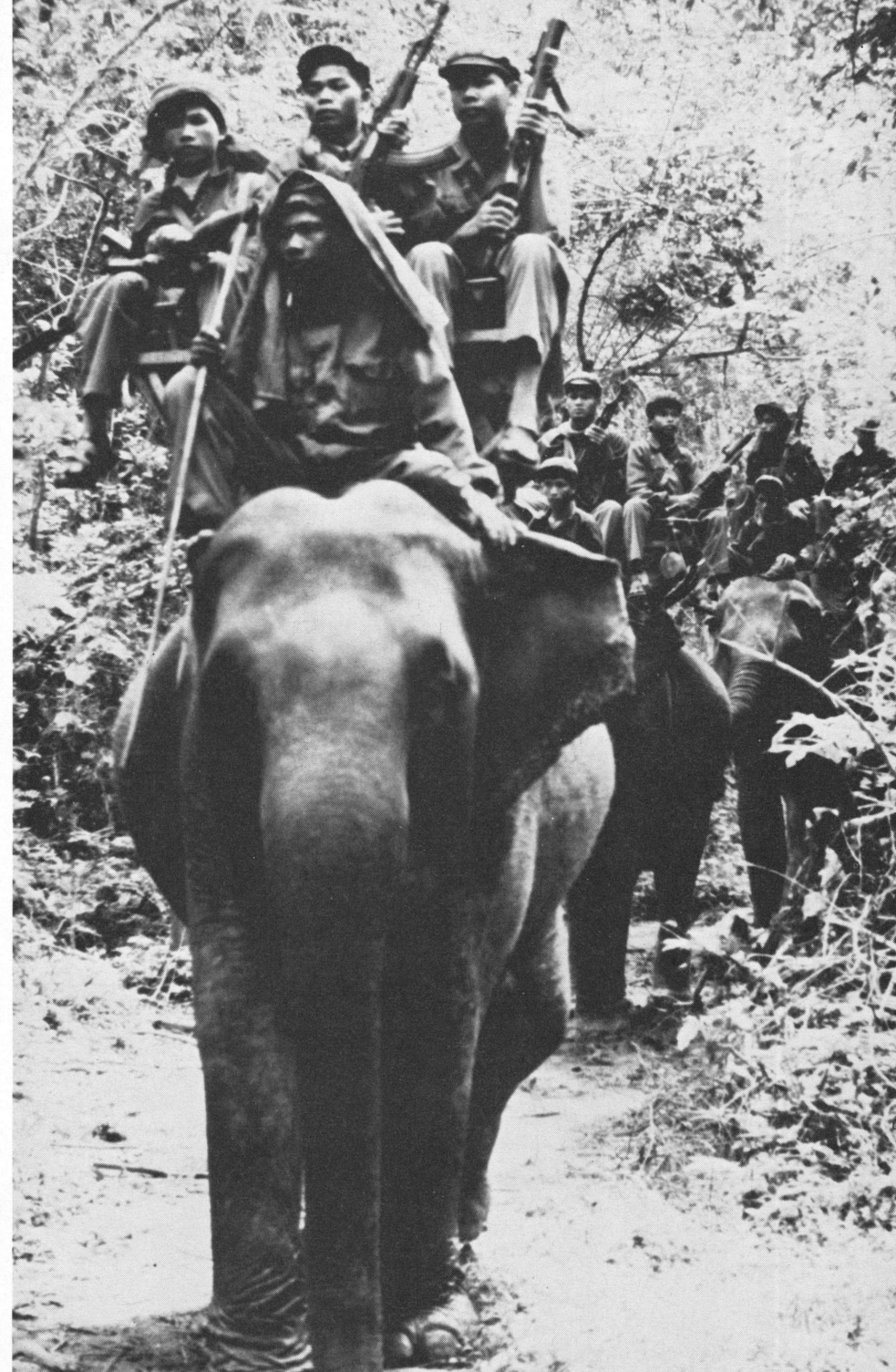
people who were caught up in situations beyond their control. After reviewing my work, he asked me to join him as cameraman on the project.

The initial plan called for us to spend two months living with the Khmer Rouge guerillas and travelling throughout the "liberated zones." We were to document the full range of Khmer Rouge activities as they carved out their primitive existence and carried on their war. Scenes were to include agricultural production, "liberated villages," schools, family life, medical treatment, political seminars, military training, and military operations. We planned to interview the current leadership of Democratic Kampuchea, including the elusive Pol Pot. Our travels were to take us to the district capitol of Sisophon, to the great lake Tonle Sap, and to Angkor Wat.

CREW AND EQUIPMENT

All of this was to be accomplished by a principal crew of Justin Ackerman as director/soundman and myself as cameraman, with the help at various times of Thai soundman Senee Mongkol, and Japanese cameraman and translator Naoki Mabuchi. French photo-journalist Denis Reichle accompanied us during a number of military operations. His years of experience in military affairs was a great asset. Before leaving the states, my biggest concern was how to equip the crew for an extended shoot in totally uncontrollable and in many cases unforeseeable circumstances. I had to be prepared to pack all needed film, equipment, and supplies into a backpacking system that could be carried through the mountains by our 2-3 man team. I also had to provide enough battery power to expose 50,000 feet of film and to power a sun-gun for occasional night shooting. There was little chance that I would find any working outlets, generators, trucks, or other sources of electricity once I left Thailand.

A normal 30-volt sun-gun was out of the question. The 30-volt battery packs are very heavy and a full charge only lasts 20 minutes. Since my camera runs on a 12-volt system, I decided to standardize things and build a 12-volt light source. A Cine-60 sun-gun head was fitted with a 12-volt/100 watt lamp and I built two 12-volt gel-cel battery packs. Each gel-



Elephants are more practical than trucks in the jungle.

cel had a 9 amp/hr capacity, enough to run the 100 watt head for a little more than 50 minutes. With two gel-cels I had enough power to expose 8-10 rolls of film.

The conditions that all of the equipment would have to survive are among the worst imaginable. Southeast Asian weather is characterized by three seasons: the dry season

from December to March, the hot season from April to June, and the rainy season from July through November. Regardless of the time of year it always seems to be hot and humid. All travel would be on foot, by elephant, or in rare cases by military truck over deeply rutted trails. The equipment did not receive any special handling. Sometimes it was packed away in reasonably protective cases, but on the trail it was often carried out, ready to be used at a moment's



(ABOVE) The Khmer Rouge retreating from the Vietnamese offensive in 1978. (RIGHT) General Ny Kon, in a front line position, plans the strategy of a major attack.

notice. I was most concerned with how the camera and lenses would hold up to the constantly changing heat, humidity, dust, rain, mud, and physical jarring they would receive. I had owned my Arri S.R. for a couple of years and had grown to trust it implicitly. It had never had any trouble running film, and it seemed to live up to the Arri tradition of being built like a tank, albeit an elegant one.

I was a bit hesitant about submitting my personal camera to this torture test, but, the entire film would be shot before any of it was processed, and I did not want to risk the fate of the project on any camera that had

not already proven itself to me. I took my two zoom lenses, a 9.5-57 that I use for handheld work, and a 12-15 that I favor for landscapes. I also used 9.5mm and 25mm Zeiss super speeds. For camera support I took my O'Connor 50 with wooden legs and a Gitzo monopod, for use when for reasons of safety and mobility, the tripod had to be left behind. Sound

"My biggest concern was how to equip the crew for an extended shoot in uncontrollable and . . . unforeseeable circumstances."

gear was a Nagra III with Sennheiser 815, Tram TR-50 and AKG 30 mikes.

Camera power problems were solved by the use of Stuart Cody's expedition batteries. These small belt-mounted packs of lithium cells weigh less than one pound each and will run 40-45 400 ft. rolls of film through the S.R. Lithium cells have a tremendous shelf life of about 6 years and will work well in almost any climate. They can however, be very dangerous and must be treated with great respect. A 12 volt lithium pack that shorts out can develop 75 amps in a matter of seconds, resulting in a very unpleasant meltdown. Other conditions can cause lithium cells to



General Ny Kon
consults with his
commanders in the
final strategy ses-
sion which con-
stitutes the opening
scene of BENEATH
THE ANGKA.



capture and in the process, release a considerable amount of poisonous O_2 gas. A lithium pack thrown into a fire can explode with the force of a small hand grenade.

One drawback to the Cody expedition battery is that it is not an on-board system and necessitates the

use of an annoying and troublesome cable between the power pack and the camera. On subsequent shoots this problem was solved by loading lithium cells into the standard Arri on-board battery pack. Unfortunately, the cells used by Cody are too large to fit into the Arri packs. I had to use

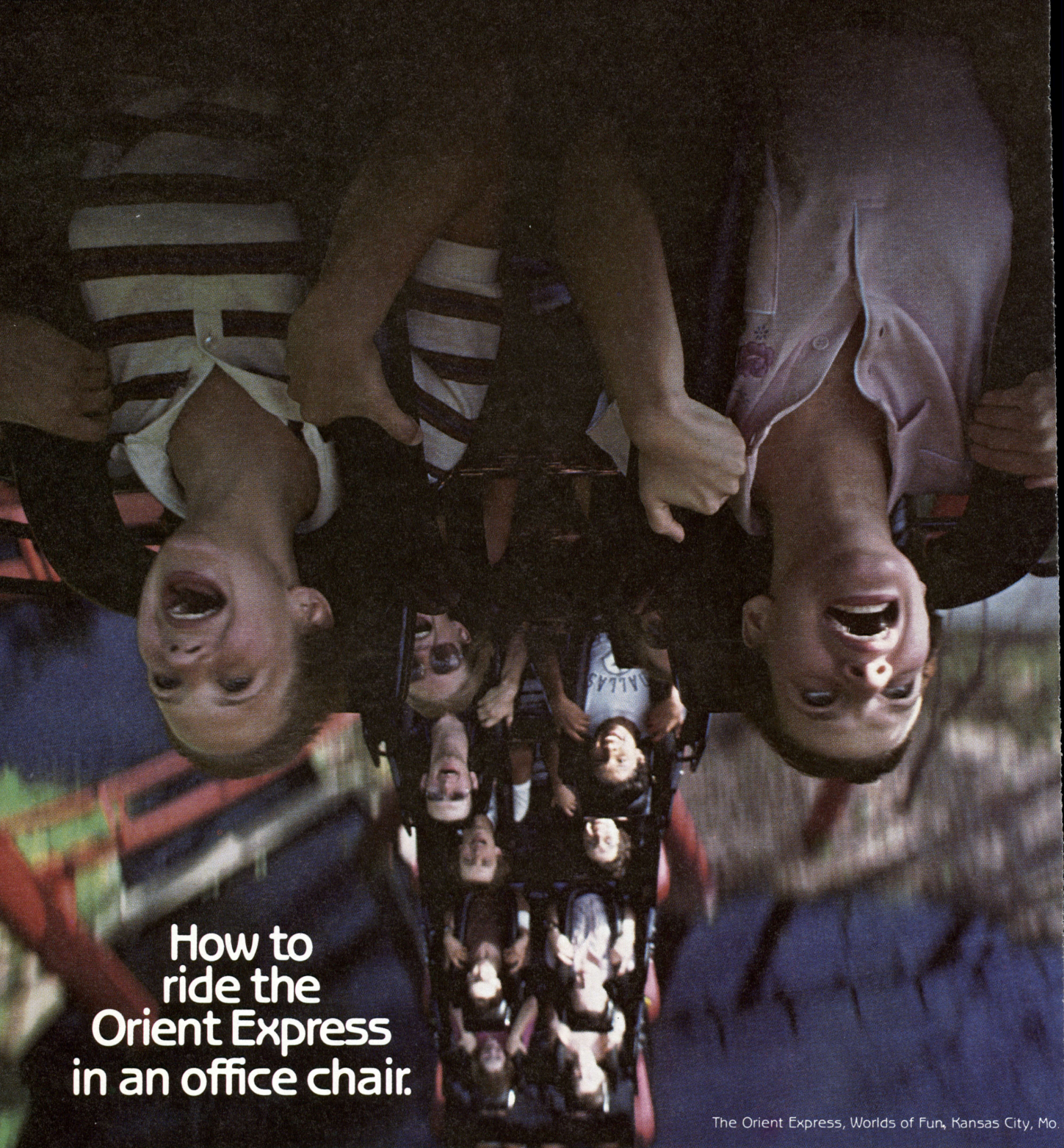
smaller cells that will only run 15-18 magazines each.

Hot and humid conditions can be disastrous for color film. Grain buildup, loss of sensitivity, color shifts, and sticky emulsions with resultant spotting and scratching are all

Continued on page 100

Bones exhumed
from mass graves
after the Viet-
namese invasion
and purported to be
the remains of vic-
tims of Khmer
Rouge domination.





How to ride the Orient Express in an office chair.

The Orient Express, Worlds of Fun, Kansas City, Mo.

On film.

Bravura Films, a San Francisco production company, uses remote-controlled and ground-based motion picture cameras to capture the thrills of roller-coaster rides for Arrow Huss Inc, the world's largest manufacturer of steel roller coasters.

For Arrow Huss, production on film is imperative. No other medium could capture the breathtaking thrills of the Orient Express

at Worlds of Fun, near Kansas City, Mo., so effectively.

The 5-minute, 16 mm color promotion film, "A Ride on the Orient Express," is one of the latest in a series of films produced by Bravura for Arrow Huss to demonstrate its products at annual meetings of the International Association of Amusement Parks and Attractions.

A hair-raising ride.

Filmed at speeds ranging from 24

to 200 frames per second, "A Ride on the Orient Express" takes viewers on a hair-raising ride that includes boomerangs, double rolls, interlocking loops, 55° drops, and speeds up to 60 miles per hour.

Shown at the 1981 IAAPA convention on a 16 mm continuous-loop projector, the film attracted large crowds to the exhibit. Following each show, Arrow Huss salespeople take super 8 prints of the film or video transfers on client



calls in parks. Footage is also made available to customers for television commercials—a handy way to promote parks with rides still under construction.

Film isn't just a matter of choice. It's a matter of necessity.

Film is logical, practical, and economical. It brings flexibility, simplicity, and superb image quality to your productions.

Film can be larger than life.

Or smaller. It can communicate directly and effectively to large audiences or individuals. It can be shown on big wall screens or small desk-top screens, on closed-circuit television, or through video-broadcast facilities.

No other communication medium offers such flexibility. And international standardization means your completed film can be shown virtually anywhere in the world, using reliable 16 mm projection equipment.

Film has simpler demands than videotape.

When quarters are close and shots tight, when you have to be mobile but maintain quality, film is a premier choice.

Film is simple, portable, and flexible. The image itself is recorded directly onto film. Basic necessities are only a cinematographer and director working with a minimum of equipment, a minimum of fuss.

With film, you can concentrate on your production rather than your tools.

Film is superior in low-light setups.

With film, you're not limited to brightly lit studios. Its low-light capability permits production in realistic situations and remote locations at minimum lighting expense. And only film offers you the freedom and precision of inexpensive frame-by-frame editing. Or the opportunity to transfer to videotape and then edit electronically.

Film meets so many objectives because it offers so many options. You can record in color or black-

and-white, with or without sound. You can employ techniques such as high speed, slow motion, time lapse, cinephotomicrography, and animation.

Film gives you a better image.

The superiority of the projected film image is self-evident. And it continues to get even better. Improvements in film emulsions enhance your capabilities without expensive new production and post-production gear.

Film has a unique look. That's why most prime-time TV programming originates on film. Whether your productions involve motivating, training, informing, or entertaining, you owe it to yourself to explore the benefits of film.

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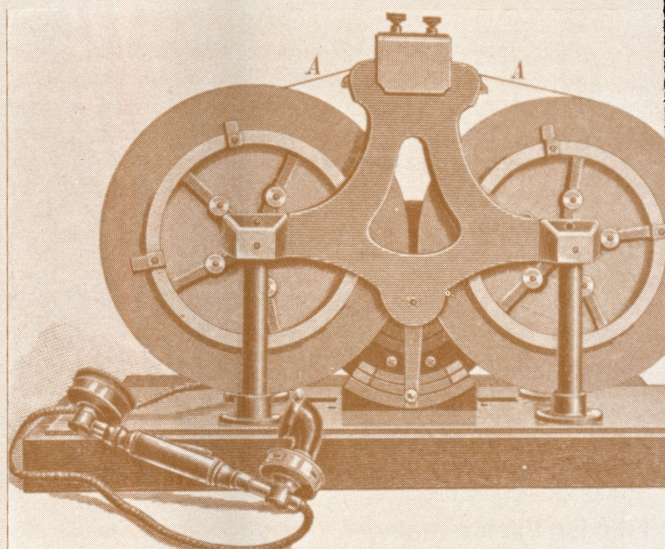
Origins of Magnetic Recording for Film

Magnetic recording technology permeates all reaches of contemporary society, especially, as readers of *AMERICAN CINEMATOGRAPHER* are well aware, within the motion picture and video industries. Conventional wisdom assumes magnetic recording to be a post-World War II phenomenon, refined by the victorious Allies from wartime technical progress appropriated from vanquished Germany; there is much truth to this assumption, of course, but it overlooks the fact that the basis for today's magnetic recording equipment and media appeared almost a decade before the war, nearly 50 years ago, and that it was from within the turmoil caused by the coming of sound to the world's film industry that there evolved the foundation of today's ubiquitous magnetic recording technology. Although the early technical refinement of magnetic recording is correctly associated with Germany, the technology's practical history actually begins in Great Britain, where magnetic recording found its first comprehensive commercial application as an important communications tool.

BRITISH FILM & SOUND

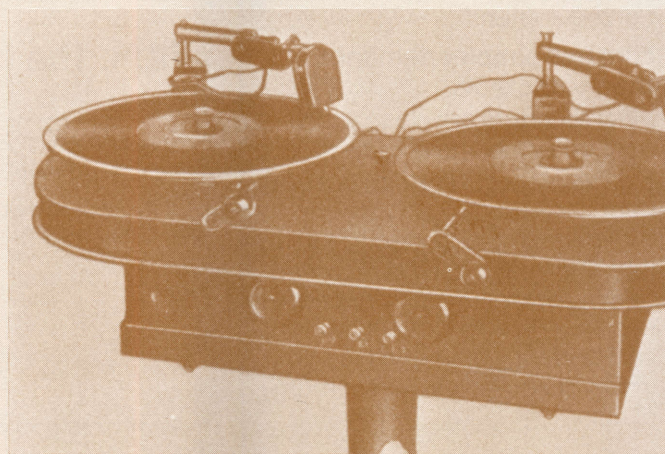
During the 1920s American films dominated British screens, leading to a severe depression within the British film industry. To revive native production, the British Parliament in 1927 passed the infamous Quota Act, which mandated that British film distributors handle an escalating quota of British-produced films over the next decade. With the promise of a government-protected market for British films, a quick increase in the number of English film production companies accompanied passage of the Act. One of these firms hoping to capitalize upon the new legislation was formed by Ludwig Blattner, a German residing in England who controlled several cinema theatres. With the profit realized with the sale of his Manchester theatre holdings, Blattner embarked upon an ambitious film production scheme to be conducted by his Ludwig Blattner Picture Corporation, Limited, formed in May 1928.

An early steel tape Telegraphone designed by Valdemar Poulsen and introduced in 1900. It was intended for recording conversations in telephone exchanges. The telephone receiver/mouthpiece for recording and monitoring was necessary before the introduction of electrical signal amplification.



With a studio under construction at Elstree outside London, European distribution contracts secured, and talent signed ranging from Anglo-German film star Lilian Harvey to ace German cinematographer (and future ASC member) Karl Freund, the prospects for the Ludwig Blattner Picture Corp., Ltd., seemed bright, indeed. However, while noted Rumanian director Lupu Pick oversaw production of Blattner's first feature during the summer of 1928, events not anticipated by Blattner unfolded which would have profound effect not only upon Blattner's company but upon the entire British film industry.

British Photophone turntables used by Blattner were a combination of two Brunswick Panatropes and a change-over and amplification system.



By July 1928, prompted by the phenomenal success of Warner Brothers' Vitaphone sound films in America, certain key London cinemas began being "wired" by Western Electric engineers in anticipation of the British debut of Vitaphone. By year's end, record London audiences were flocking to see Al Jolson in *THE SINGING FOOL*, and the fate of the so-called silent film appeared sealed in England. Like virtually all of the marginally-capitalized, Quota-spawned producers, Blattner found himself caught short by the sudden shift in demand from silent to sound films. Just as the Quota brought forth a flood of film production firms,

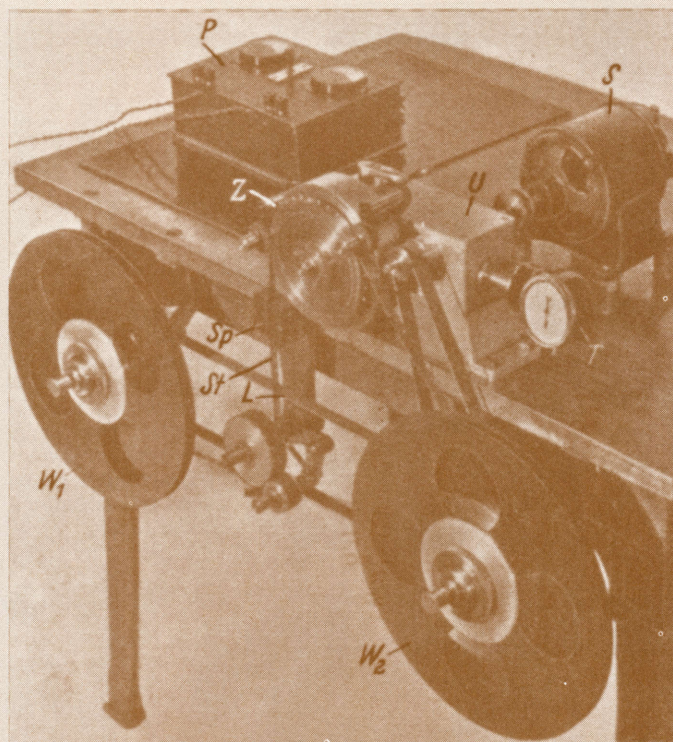
BLATTNERPHONE

by WILLIAM LAFFERTY

the sudden emergence of the sound film brought forth a bevy of sound film equipment manufacturers, all hoping to exploit the confusion caused in the British industry by the coming of sound. Luckily for Blattner, he managed to arrange an agreement between his firm and a newly formed British sound film equipment company, British Phototone, Limited, a subsidiary of Brunswick Balke Callender Company, then America's third largest phonograph manufacturer.

Blattner contracted to produce a series of short musical films for British Phototone, synchronized with British Phototone's apparatus, giving Blattner a foothold in the sound film market. The Phototone equipment resembled that of Vitaphone, consisting of two turntables for reproducing synchronous sound off 16-inch discs. Disc change-over, accompanying reel change-over, was accomplished by metal clips set astride the sprocket holes at the appropriate point on the projected film; as the clips passed a pick-up in the projector they completed a circuit which (the projectionist hoped) started the second turntable in synchronization with the next reel. The Phototone system evolved from Brunswick's popular Panatrope electric phonograph, developed several years earlier by Brunswick in co-operation with General Electric (and, ironically, with the same GE engineers who would soon play a major role along with Westinghouse in the development of the RCA Phonophone photographic sound system).

Technical problems plagued the Phototone system, though, forcing British Phototone to replace parts of its apparatus with components from a rival German disc outfit, that of Lignose-Horfilm AG. By the time these technical problems were solved late in 1929, however, British Phototone was already in bad financial shape, the popularity of disc systems quickly waning as exhibitors and producers came to prefer the less cumbersome and more reliable photographic sound-on-film processes. When Western Electric announced it would discontinue discs and disc equipment for sound



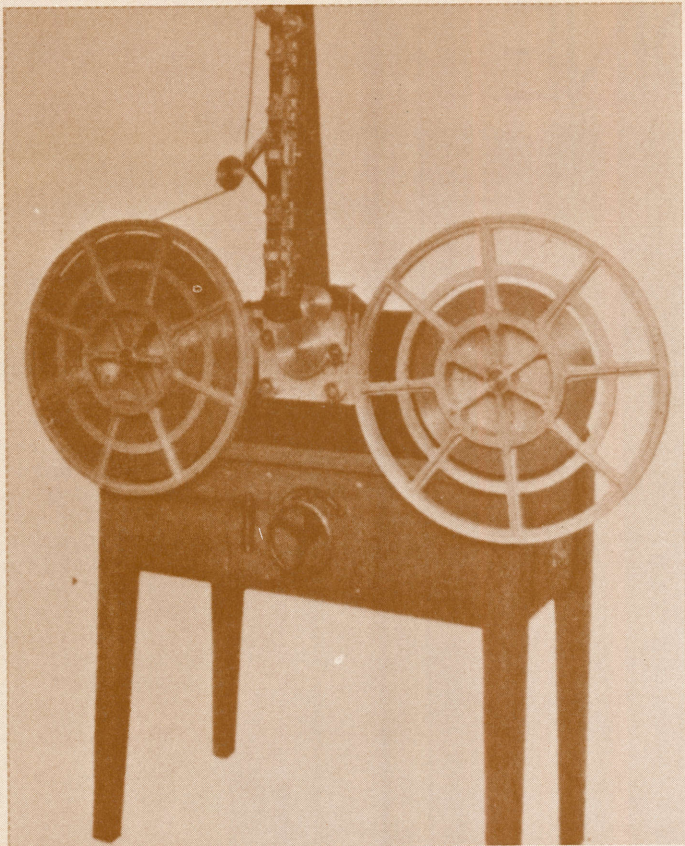
Curt Stille's prototype magnetic recording apparatus for films. W1 is the supply reel, W2 the takeup reel, St the steel tape, Sp the recording/reproducing head, U is a commutator for reversing the drive motor S, Z a sprocketed wheel, P the rheostat and L indicates the sprocket holes in the tape.

films by Fall 1929, British Phototone, faced with the loss of its entire market and nearly bankrupt, reneged its contract with Blattner for its "Phototone Reels." Aware that British Phototone's days were numbered, and with his only feature film, the silent *A KNIGHT IN LONDON*, failing to find distribution, Blattner decided to enter the sound film equipment market himself, purchasing the rights to a magnetic sound film apparatus unaligned with any American or European manufacturer and representing a radical approach to sound recording for motion pictures.

THE BLATTNERPHONE

Faced with the deteriorating state of British Phototone, Blattner in late 1928 purchased rights to a steel tape magnetic sound recording device developed by a German engineer, Dr. Curt Stille. Stille's recorder was based upon perhaps the earliest practical form of sound recording; despite its relatively late technical perfection compared to disc recording, magnetic recording had represented, theoretically at least, possibly the most efficacious sound recording means before the turn of the

century. As early as 1881 Thomas Edison's researchers had actively considered the properties of magnetism (as well as photography) to provide a medium for Edison's gramophone. In December 1898 the true commercial history of magnetic recording began when the Danish government issued a patent to Valdemar Poulsen, the renowned electrical engineer, for his "Telegraphone," a magnetic wire recorder which closely prefigured the basis of today's magnetic tape recorder. Poulsen attempted to exploit his various magnetic recorder designs in the telephonic transcription and dictation markets, but the inability to amplify the magnetic record's weak electrical signal forced magnetic recording to the background while the mechanographic recording devices of Edison, Berliner, and others gained ascendancy. Stille had been actively interested in magnetic recording's potential since 1903, and with the lapsing of Poulsen's original patents and the advent of the Audion tube for electrical signal amplification, Stille formed his own firm in the early 1920s to publicize and develop magnetic recording equipment. Although like Poulsen he concentrated upon the dictation market, Stille saw a



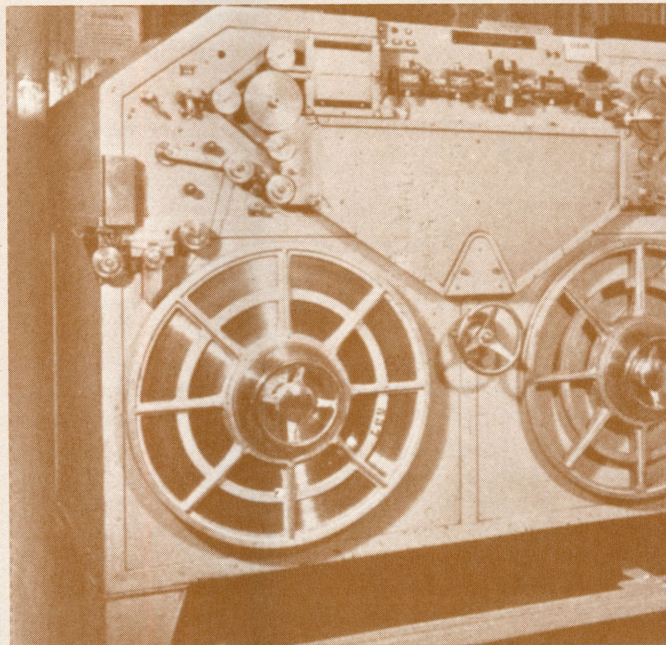
The first generation BBC Blattnerphone. Head wear from the steel tape necessitates the extra emergency head assemblies shown on the column in the center.

keen opportunity to exploit further his devices with the appearance of the sound film. Introduced to Stille through Karl Freund in Berlin, Blattner decided to invest in Stille's idea for a magnetic sound recorder for films.

The idea of uniting magnetic recording and film to form sound motion pictures was itself hardly new in 1928. Lee de Forest, the self-proclaimed "father of radio," reportedly joined one of Poulsen's original Telegraphones with a film projector in 1913 to form a rudimentary sound film system; in 1915 a Minnesotan, Henry Bullis, filed a U.S. Patent application entitled *Method of Producing Magnetic Sound Records for Talking-Motion Pictures*. In 1917 the British technical journal *Machinery* suggested magnetic sound as a possible solution to the synchronization problems encountered by early sound film experiments. By 1923 another American, Eugene Peterson, obtained a patent describing a magnetic sound system for motion pictures, and in 1927 an American patent was issued to Joseph O'Neill of New York for a sound film process closely resembling the magnetically-striped filmstock which appeared twenty years later. With the sudden surge of interest in sound films during the late 1920s, experimenters paid increased attention to

magnetism to develop a viable, competitive sound system. Both the German sound film combine Tobis and Dutch motion picture innovator Heinrich Kuchenmeister had filed various European patents by 1928 describing applications of magnetic sound recording to film work. One of the more interesting proposals involving magnetic recording was a variation

The Marconi-Stille machine, while more sophisticated technically than its predecessors, was well over four feet tall.



upon George K. Spoor's idea of "engraving" the film's sound record in the film itself alongside the sprocket holes, recording and reproduction accomplished as in phonographic recording by using a stylus. A Frenchman working for Leon Gaumont, René Nublat, suggested filling the embedded sound record with a magnetic fluid. After the fluid had solidified, a sensitive electromagnet replaced the stylus for reproduction; Nublat reasoned that replacing the groove-stylus combination with the magnetic outfit would reduce wear on the sound record. Meanwhile, as Blattner became interested in Stille's equipment, a New York electrical engineer, Sydney Baruch, demonstrated a Poulsen Telegraphone at local movie theatres, claiming that he was about to adapt the device to providing an inexpensive sound system for films. None of these ideas ever reached any commercial fruition, in marked contrast to Stille's sound film equipment for Blattner.

Stille's magnetic sound apparatus for motion pictures differed little from Poulsen's original devices in its rudimentary recording/reproducing heads and DC-biasing, but it did contain amplification and loud-speaker circuitry and certain accommodations to its anticipated film work: instead of the 0.25-mm wire of his magnetic dictating machines, Stille used a 6-mm wide 0.05-mm thick steel tape perforated down its centerline, the perforations intended to mesh with a sprocketed drive capstan, ostensibly to insure syn-

Continued on page 10



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Flying Effects For THE GREATEST AMERICAN HERO

by CHUCK CHAMPLIN



The situation facing the producers of "The Greatest American Hero" in the fall of 1980 was simple: if they couldn't make their hero fly, they couldn't do the show.

Well, actor William Katt as reluctant superhero Ralph Hinkley does fly. It's not with the greatest of ease thanks to some legal battles with another caped wonder, Superman, but he does get from one crisis to another without visible means of support.

Chris Nelson is the producer of the show for Stephen J. Cannell productions in Hollywood and as he tells it the flying only happens because of the superpowers of some special effects people in Hollywood. The saga reveals a lot about the solving of cinematic dilemmas, TV style, and it also provides a look at two very different effects systems at work: the Ultimatte video compositing unit (AMERICAN CINEMATOGRAPHER, October, 1982), and the Zoptic front projection technique developed by Zoran Perisic and used in the "Superman" movies and now available in Hollywood.

When ABC gave the go ahead for a

pilot of "The Greatest American Hero," the producers, then Cannell and Alex Beaton, began a search for an effects house to which they could contract the flying effects. Their requirements were speed and cheapness. As Nelson put it, they had to be able to shoot today and see the results tomorrow.

That left out traditional film blue screen, with its three-week turnaround and costs of approximately \$2,500 per composited shot. Also, it was thought that a superhero with frizzy blond hair would make a terrible matte. The only solution that seemed practical was to shoot film of a flyer suspended in front of a blue screen and use a video compositing system to marry that foreground with backgrounds of aerial photography shot from a helicopter.

Cannell Productions finally contracted with Magicam (then on the Paramount lot and fresh from much blue-stage work for public television's "Cosmos" series) to produce flying scenes and other special effects for the "Hero" pilot. (Magicam, created by Joe Matza, has since left the Para-

mount lot and regrouped as Las Palmas Productions, primarily doing commercials and motion-control photography.)

Magicam's Stage 29 on the Paramount lot already contained a three-sided cyclorama about 30 feet high with a 60-foot back and 40-foot sides. The floor was cast epoxy, sanded perfectly smooth and painted blue. Overhead, a carriage supporting a wire flying harness ran along a 65-foot track, its motion controlled by ropes. Later, an electric motor was installed to propel the carriage and hydraulics were added to raise the harness.

The harness itself, supported by two thin, high-test wires, was "a very painful, high-tech jock-strap," according to Magicam's director of photography, Alex Funke. Actor Katt had to wear a lead plate on his back so he could tilt into the proper flying position. Fans ruffled his cape and hair. Filming was done with 35mm Panaflex X cameras, sometimes mounted on a Louma crane for shots where a floating effect was desired.

The most significant flying scene produced at Magicam was the first in



the pilot, where Katt actually learns to fly using the magic costume given to him by spacemen. He was to fly erratically down an alley and crash into a billboard, but because it was his first flight it was thought important to show his feet leaving the ground. This presented special problems because the composited image would have to be rock steady; any slippage of the actor's feet against the ground would destroy the illusion. In normal flying scenes, motion against the background would just be interpreted as floating.

First a background plate was shot in an alley with a young boy explaining how to fly to an empty spot Katt would occupy: "No, that's not how

you do it. Like this. One, two, three, jump!" At that point, the camera lens zoomed back, supposedly following Katt's progress into the air. That lens movement was then duplicated exactly on the Magicam stage as Katt ran and jumped and was lifted into the air on the wire harness, all in front of the blue backing.

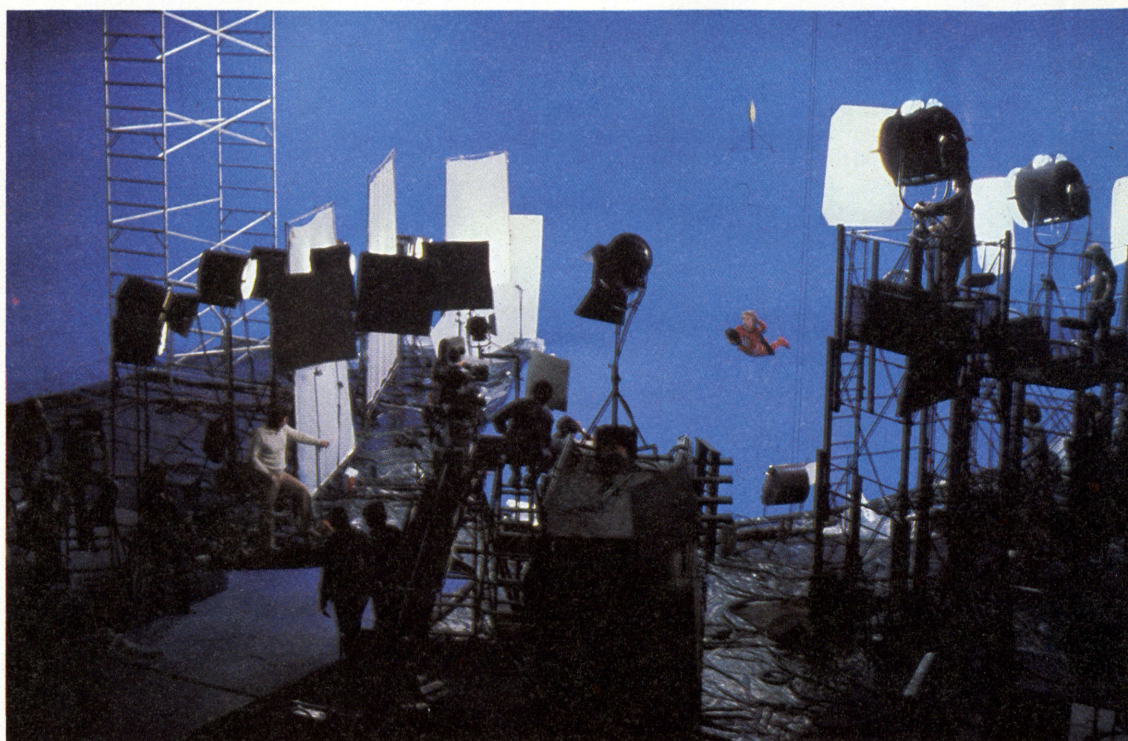
Then came the compositing step. The footage shot in the alley was transferred to 1-inch videotape using a specially modified Mitchell camera movement built into a projector that beamed the photo image into a video camera. The Mitchell movement's high-speed pulldown locked the film firmly into position during the milliseconds in which the video camera pre-

pared to make its scans of the film frame.

The ponderous, projecting contraption, designed by Magicam, became affectionately known as the Dieselselflex, because it was so noisy and would only move the film at 24 frames a second, forward or backwards.

Then, the background plate recorded on 1-inch videotape, the foreground image of the actor in his harness in front of a blue backing was likewise projected into the video camera and routed as an RGB signal into an Ultimatte video compositing system. The unit processed the two signals, foreground and background, and mixed them electronically to make the composite which was then

(ABOVE LEFT) Katt flies over the ocean with the help of Ultimatte blue screen compositing.
(ABOVE RIGHT) The Zoptic front projection system gives Katt an overview of the freeway.
(RIGHT) Katt is suspended in front of a blue screen for a shot to be composited with a background via Ultimatte.



recorded onto 2-inch videotape.

The last step in this process devised by Magicam was to transfer the composited video image to film, which was done by Image Transform in North Hollywood. While that company is the best at this process in the business, everyone involved with the show agreed, tape-to-film transfers are "the wrinkle in the whole business of video opticals," as Chris Nelson put it. Since the show was being produced and edited on film, there was no choice but to get the image back from video to film, despite the

increase in graininess and reduction in contrast. The loss of image quality was deemed acceptable for television.

For the "Hero" pilot, several days of filming were done on the Magicam blue stage. That included shooting foregrounds for combination with about eight specific background plates: to show Katt flying over walls and into bushes, carrying co-star Robert Culp, etc. Also, whenever possible, Funke shot foregrounds for a library of generic flying shots that could be drawn from later and com-

posited with new background plates. When ABC ordered seven episodes of "Hero" as a midseason replacement, before the pilot even aired then-producer Alex Beaton decided to shoot two more days at Magicam hoping that that, and perhaps another pair of shooting days, would give him enough foreground library material to serve for the seven shows. At approximately \$75,000 to set up and shoot on the Magicam stage, he wanted to get his money's worth.

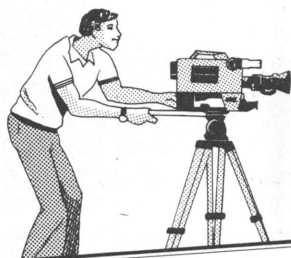
Because he didn't know what sort of background the flying would be matted with, Nelson, who directed the shoot, and Funke, had no choice but to light Katt very flat and even, with no suggestion of a dominant light source. But they got a little of everything: Katt flying towards the camera, flying away from the camera, across below, entering from the right, the left, the top, coming from far away, flying close and then over the camera. All angles that were possible were shot, using the harness or Katt lying on a blue board.

Also, since Cannell Productions was being sued by Warner Bros. over the alleged similarity between "Hero" and "Superman," none of the flying that Katt did could be straight-line flying. Cannell's defense against the suit was that the two characters were not similar because Katt flew erratically, but now he could never be shown flying straight, even for a moment, which put restrictions on what they could film.

Nelson got his money's worth out of the two day shoot at Magicam. He got enough generic foreground shots of Katt in front of blue backing to draw from for the first seven shows ABC ordered, and then for the next full-season of 22 shows. But not because he planned it that way. He never had time or money to go back.

The compositing process changed shortly into production of the first seven shows. Magicam realized that the "Dieselflex" rig was not working quickly enough in transferring the film to video for compositing, and in the meantime, Nelson got a good offer from Bill Hogan, director of Ruxton Ltd. in Burbank, to do the conversion and compositing of the images. For virtually all the 29 regular shows, images were combined at Ruxton, using a Rank-Cintel, film-to-tape transfer device and the Ultimatte compositing system.

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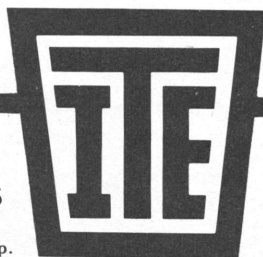
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Steven Spielberg

About 32 years ago, Howard Hawks produced *THE THING FROM ANOTHER WORLD*, a masterful film about a malevolent being from another planet wreaking havoc at a far outpost of our earth. The title character, portrayed by James Arness, not only scared the daylights out of millions of patrons but instilled in them a

distrust of anything from "out there" as they heeded the warning spoken at the close of the picture: "keep watching the skies!"

Producer-director-writer Steven Spielberg changed all that some years ago with *CLOSE ENCOUNTERS OF THE THIRD KIND*, a highly successful film about *benign* visitors

from outer space. Recently, he went a step further and brought to the screen an alien being that is not only benign but lovable—a strange little creature known only as E. T. The picture in which the being appears is *E. T. THE EXTRA-TERRESTRIAL*, which has been the most talked about and financially successful film of the past year.



and

E.T.

by GEORGE E. TURNER

THE EXTRA-TERRESTRIAL

Already a "cult" film, E. T. will, in all probability, become a perennial audience favorite like a mere handful of fantasy films such as KING KONG and THE WIZARD OF OZ.

As for Spielberg himself, he is a pleasantly eloquent young man in his mid-thirties who first gained attention with his direction of a segment of NIGHT GALLERY and the TV feature DUEL, gained fame with the celebrated JAWS, and has flourished as one of Hollywood's top filmmakers with CLOSE ENCOUNTERS, 1941, RAIDERS OF THE LOST ARK and POLTERGEIST. That he has managed to invest E. T.—a mechanical being engineered by Carlo Rambaldi—with a charm and personality achieved by few real performers—is a remarkable achievement.

"I don't think anything in film comes to anyone in a blinding flash," Spielberg said when *American Cinematographer* asked him how he was inspired to create E. T. "Creative people in art or architecture or filmmaking or theater or writing are all products of a collection of impressions from our earliest memories. I don't think there is such a thing as a cathartic flash of white genius light—that's a popular myth. We're all inspired. I'm inspired all the time, but my inspirations are a sum of all my parts, and all of my parts started back in 1947 when I was born in Cincinnati, Ohio, and kind of accumulated the dust or the pollen of my experiences right up until E. T.

"So, I can't really say that E. T. dropped out of the sky and hit me on the head without a number of experiences from the time my father made me go with him at two o'clock in the morning to watch a meteor shower when I was six years old and I suddenly realized that the sky up there and the stars are worthy of closer scrutiny, all the way to the time I saw

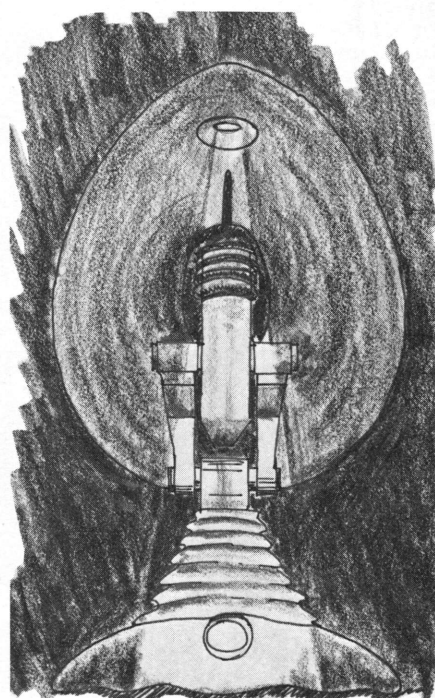


Director Steven Spielberg and leading actor Henry Thomas on E. T. location.

THE WIZARD OF OZ and PETER PAN and every Disney film ever made and all the films of Hitchcock and Kubrick and read all the novels of Steinbeck and Faulkner and all the experiences I ever had in elementary and grammar school and high school and college to bring me to a place in my life where I found myself standing out in the Sahara Desert shooting RAIDERS OF THE LOST ARK and, indeed, something *did* fall out of the sky and hit me on the head in the shape of a small, fat little squashy character named E. T. "

Spielberg had high praise for the

(RIGHT) One of hundreds of preliminary sketches by production Designer Jim Bissell.





work of cinematographer Allen Daviau, his choice for E. T. "It was a choice I had made once before when I was a student at Long Beach State College. I wanted to break into the film business and my 8mm and 16mm films weren't doing the trick—the studio heads and producers weren't looking at 8mm in their offices anymore—so I raised some money from a young man who wanted to be a producer, who had the same burning de-

sire to produce as I had to direct. He had an optical company and he could afford \$10,000 toward a film. It was a film called AMBLIN'. I had worked with Allen Daviau on a short film that was never finished called SLIP-STREAM, which was about a bicycle race starring Tony Bill made when I was about 18 years old. That film was shot by a director of photography named Serge Haigner, but Allen Daviau assisted him and Allen and I

became pretty good friends. I offered Allen a chance to d.p. AMBLIN', so it was a pretty big break for both of us."

"I really liked Allen's work in AMBLIN' because his work in that was as slick as my work was and Allen and I are proud of the movie in different ways. I like AMBLIN' because it worked and got me into the film business and Allen liked it because it was shot in 35mm. I don't know how crazy we are about our individual work in that film, but I always think of Allen as a terrifically versatile cinematographer who can do anything with light and shadow. I've worked with some of the greats. Bill Fraker probably has been one of my greatest experiences on a movie studio floor or on location, and Vilmos Zsigmond was very fulfilling to work with, and yet I didn't want to work with a high profile cinematographer on this. I wanted to work with someone who was a little hungry, hadn't done a theatrical feature before, was going to make an audacious first impression, and was going to help bring this picture in for ten-and-a-half million dollars and no more than 58 shooting days. I just didn't know if I could get any of the guys I'd worked with before to shoot an adventure film in 58 days. I thought I could probably get Fraker to do it; Billy can shoot very quickly with

E. T. Stills by BRUCE McBROOM

(ABOVE) The white, glaring nightmare of a family's home being transformed into a field hospital is dramatized by ingenious use of lighting. (RIGHT) Scenes of fantasy seem real because they are staged in familiar suburban settings—in this instance, the back yard of a middle-class home.

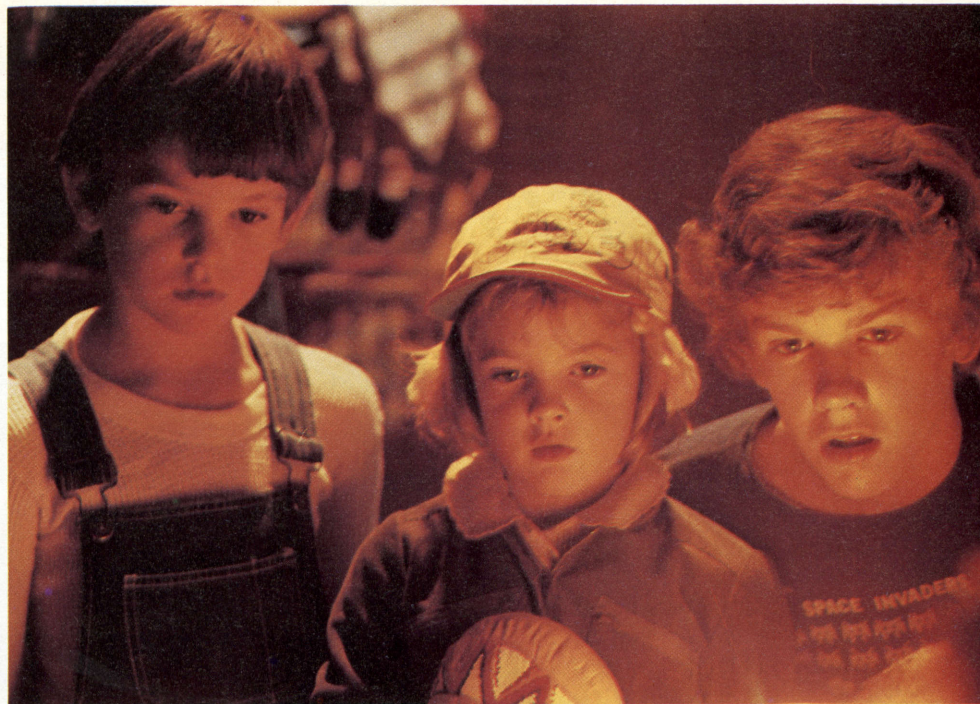


great quality, but he was busy at the time. I remember approaching Billy first and he was working on something and really wasn't available when I needed him. I offered the film to Storaro, but he was just coming off of *ONE FROM THE HEART* and he was very bitter about his experience

"I don't think there is such a thing as a cathartic flash of white genius light—that's a popular myth."

on having to take a lighting design credit and not being able to get the director of photography credit because of the bylaws of the IATSE. He just didn't want to make another picture in America and I was willing to fight for him, but he wanted to go back to Italy and work for Bertolucci and he was sort of fed up with the whole Hollywood business.

"Well it was the darndest thing, I was watching a TV movie and it was something Allen Daviau had photographed. I was really impressed and I did something that I rarely do, I



didn't think twice: I picked up the telephone that night and phoned Allen and said, 'Would you photograph my next feature?' There was a rather stunned pause on the other end of the phone and Allen said, 'Why?' I said, 'I just saw something on television which knocked me out and I'd love for you to work on this.'

"Allen and I had decided long ago,

before we ever did any concept sketches, I didn't want to show E. T.'s face for about 25 minutes—that's the way I wrote it in the script. Yet E. T. and his friends are on the screen from the second or third shot of the picture. I didn't want to see his face until very late in the first act of the movie, and that probably gave Allen his biggest

Continued on page 80



(ABOVE) The memorable scene in which Henry Thomas introduces E. T. to his sister, Drew Barrymore, and big brother, Robert MacNaughton, is bathed in warm yellow light. (LEFT) A consistent style of lighting keeps E. T. at once mysterious and convincing.

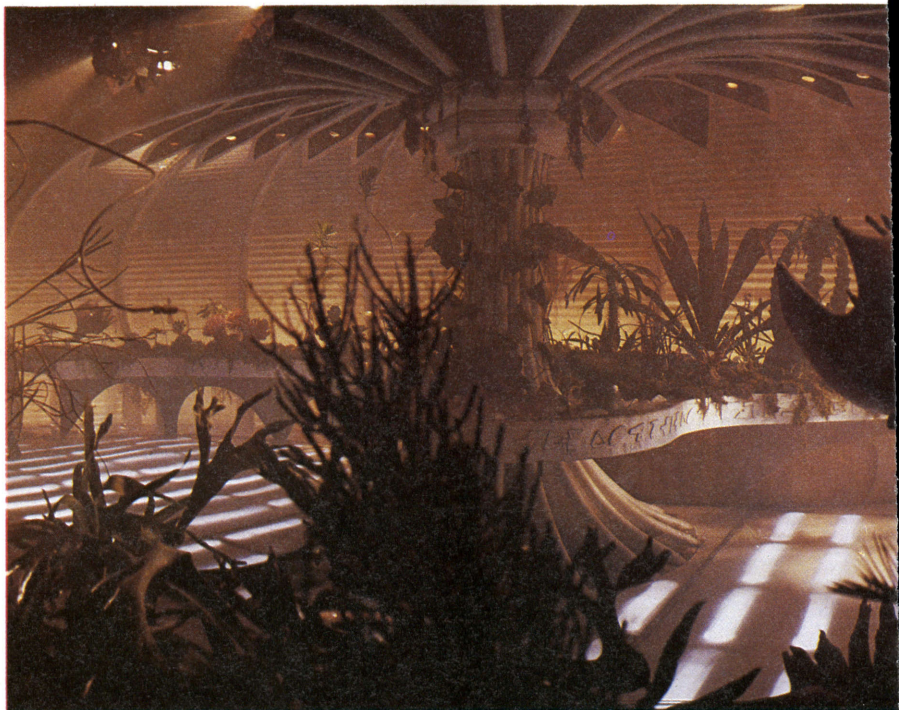
Production Design

When production designer James D. Bissell was assigned to a Steven Spielberg project called *A BOY'S LIFE* in May of 1981, he was told it would be "an intimate, small picture." It was scheduled for three months' preparation, but it didn't actually go before the cameras until September. Bissell remained on the picture into December, then returned for additional scenes in January and February. By then, the title of the picture had been changed to *E. T. THE EXTRA-TERRESTRIAL*, and Bissell had been a key part of an extraordinary film.

"It was a very collaborative project," Bissell says. "I was able to work very closely with Steven and the cinematographer, Allen Daviau. There was great rapport with Ed Verreaux, the production illustrator, and this was our first picture together. Since then we've worked together on *THE TOURIST* for Universal and *TWILIGHT ZONE* for Steven at Warner Bros. I also had the invaluable contributions of set dresser Jackie Carr, set designer Jim Teegarden and construction coordinator Ernie DePew."

Jim Bissell is a young man who has risen rapidly in the industry. A 1973 graduate of the University of North Carolina, he spent three years working on TV commercials, later as a production coordinator. After working as location manager for Twentieth Century-Fox on *NOT FADE AWAY*, which was filmed in Mississippi, he came to California. He was art director of the Emmy-winning *PALMERS-TOWN, U.S.A.* (1977) for Tandem.

"Steven Spielberg saw the *PALMERSTOWN* sets and seemed impressed not only with their quality but by the number of sets on the stages," Bissell recalls. "One thing I can do is use space very well." After making several Movie of the Week entries at Laird International Studios, including *VALENTINE* and *ANATOMY OF A SEDUCTION* in 1979, and re-dressing Bronson Canyon for segments of the



240-ROBERT series, he was hired by Spielberg for *E. T.*

"We built small models of all the sets and I discussed the lighting at length with Steven and Allen. We made many changes as a result—for example, I changed the windows in the family room because Allen wanted more light. All of these things were arrived at for everybody's benefit. We had four months of preparation. I worked with Ed Verreaux and Jim Teegarden in the early stages, and later with Jackie Carr and Ernie DePew.

"I knew the basic style Steven was aiming for. It had to be realistic and yet the whole thrust visually was to give it a fantastic quality. Several sets had to have a mystical look."

All the interior sets and some of the exteriors were built on sound stages at Laird. Three large stages were filled to the walls with elaborate sets, as Bissell explains:

"Stage 3 held the entire back facade of the house, all of the back yard including the hill the children walk up, and the ground floor of the entire

house. The latter included a family room, kitchen, living room, dining room, and entrance.

"Stage 2 contained the second floor of the house complete, including Elliott's room, hallway with stairs, Mary's room, Elliott's closet, and second closet set built on a high platform for special photography.

"On Stage 4 was the swing set with the landing site, which had to be shot both with and without the spaceship. No interiors were done on location except the schoolroom, which is an actual site in Culver City.

"The front of the house was a practical location. Steven had picked the house and neighborhood in Northridge, but the house didn't work. We did the neighborhood stuff in Northridge but the house we used was in Tujunga. It was slightly apart, on a street set back from the others. The people who owned it were very kind. They had just moved in and we had to lay in the landscaping. It was in late July, and the sun fried the grass we put in.

"We did a week of location work

for

E.T.

by ALLEN D. LOWELL

near Crescent City, where we shot the redwood forest stuff. The hunt through the forest had some preliminary storyboard work, but actually even planned it as he shot. We used a lot of stratified light there. That sequence had much of BAMBI and some of PETER PAN in it."

The interior design of the house was planned carefully to convey the varying moods of the film and reflect the personalities of the family members. Bissell explains that, "the family room is where the kids really play and hang out and also where we see the mother. Her rooms are *adult* rooms. We used warm tones in the childrens' rooms, more vibrant colors, warm carpets, yellow lighting and so on. But the living room is a cool gray with steel-gray carpeting. It has sophistication, coolness. It wouldn't appeal to children very much.

"After getting the color schemes worked out we obtained the wallpapers, materials for sofas, and so on. I gave colorboard samples of all the wall coverings to Allen so he could make any changes he wanted to for better photographic interpretation. All of the interior rooms were ceilinged. The ceilings were made of muslin, which made it possible to place lights above the ceilings. The main set was almost surrounded by a huge, 290 degree, gray cyclorama.

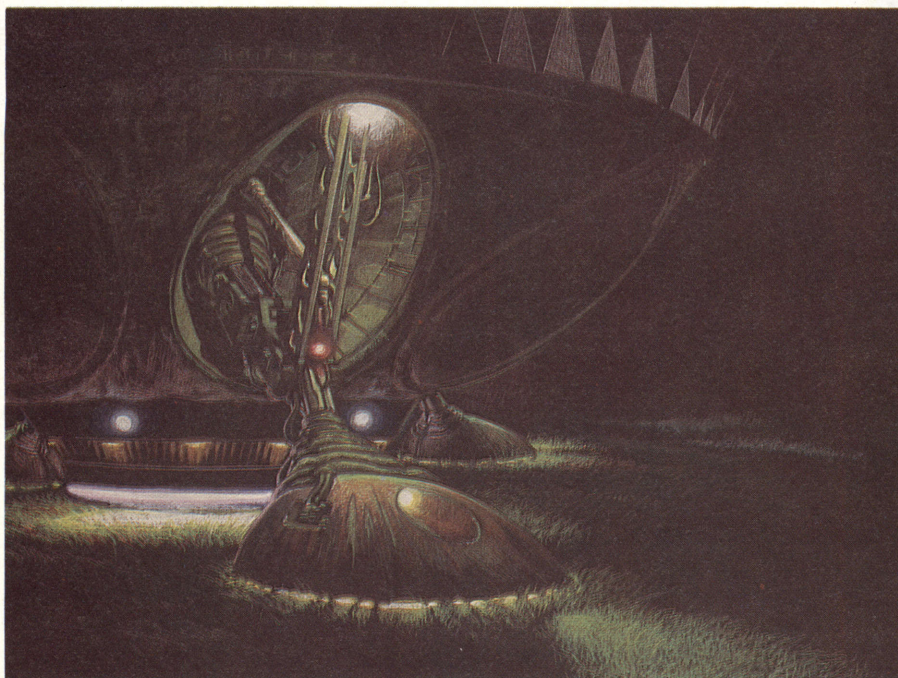
"The children's rooms were designed to show them as places to get away from harsh, cold realities. It was uppermost in my mind that we had to make the home a lovely little nest so it would become more of an icy, cold nightmare when the scientists move in. E. T. himself was from a world that had come to terms with its own technology and learned to live with it."

According to Bissell, the transformation of the home into a government field hospital brought many problems. "We had to locate a plastic covering for the whole thing. Finally we came up with a 190 x 150-foot sheet of polyvinyl chloride 30 mils thick, which was made specifically for us. We had two different materials, clear inside and matte outside. The matte plastic, when held close to the house, gave it a ghostly image. The big plastic tubes also were manufactured for us. The plastic covered sets got very hot, so we constructed wild walls on hinges so they could be opened up for air when off camera.

"The back yard with the cornfield used a lot of dirt with pads under it. I tried to provide as many textures as possible for lighting effects, such as the latticework in the shed. The hill was built up on jacks, lots and lots of

(LEFT) The strange but beautiful greenhouse aboard the alien space craft is one of James Bissell's imaginative E. T. sets. (RIGHT) Bissell oversees construction of the space craft on a sound stage at Culver City.





The renderings on these two pages, which are based upon the designs of Jim Bissell, are the work of Ed Verreux, a leading production illustrator. The exterior of the spacecraft in which E. T. comes to earth are shown above, left and right. The alien greenhouse, with its strange plant forms, is shown below. In planning construction of the sets, Bissell calls for only the parts which will show; the other elements existing only in the minds of the viewers.

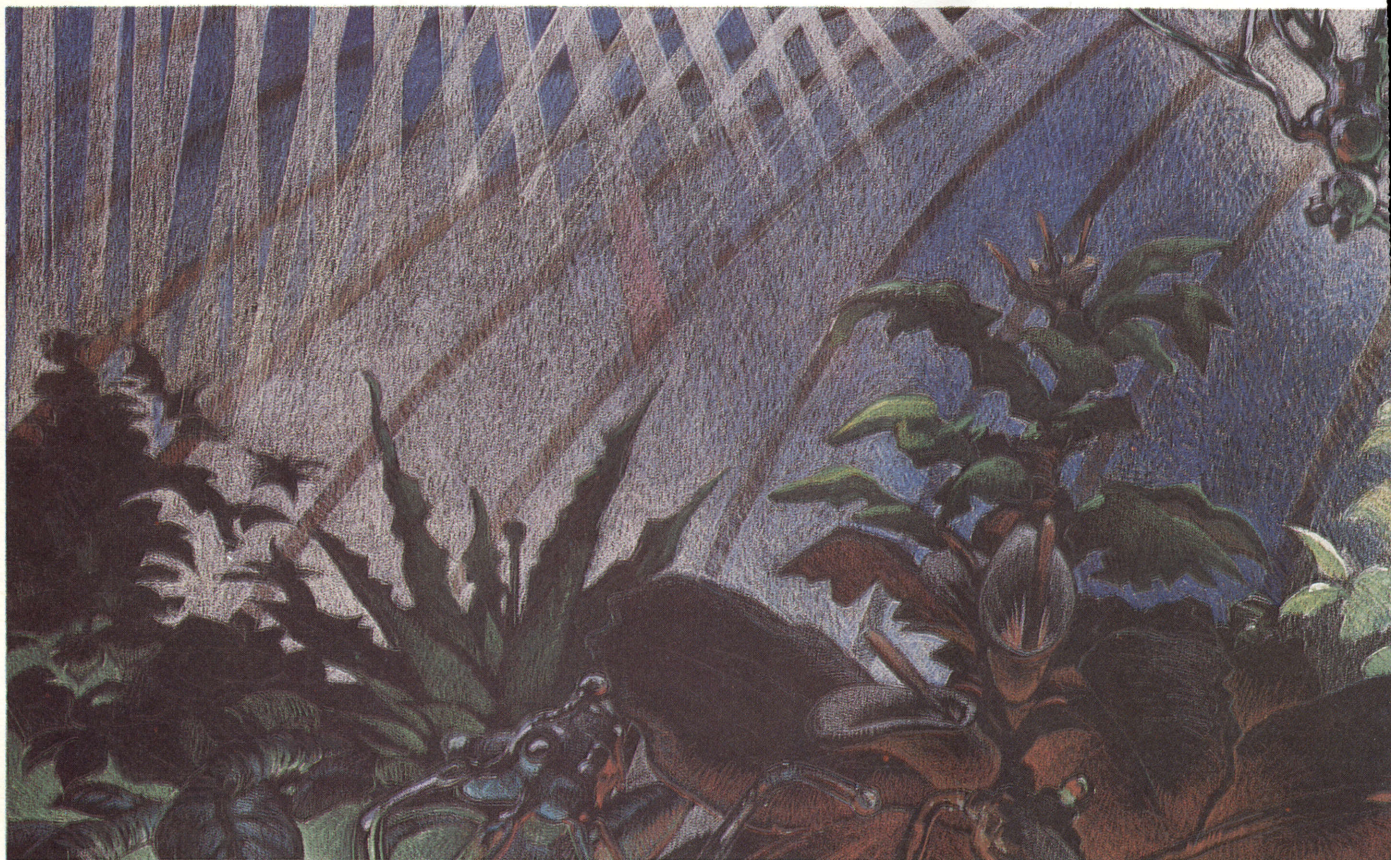
jacks. At it's highest point it stood about 14 feet from the stage floor. Following our contour studies we did the structure, building first in plywood then adding plaster, then real rock and finally plants set in holes. I tried to make it look overgrown a little bit and not too landscaped. It was about 50 to 60 feet long.

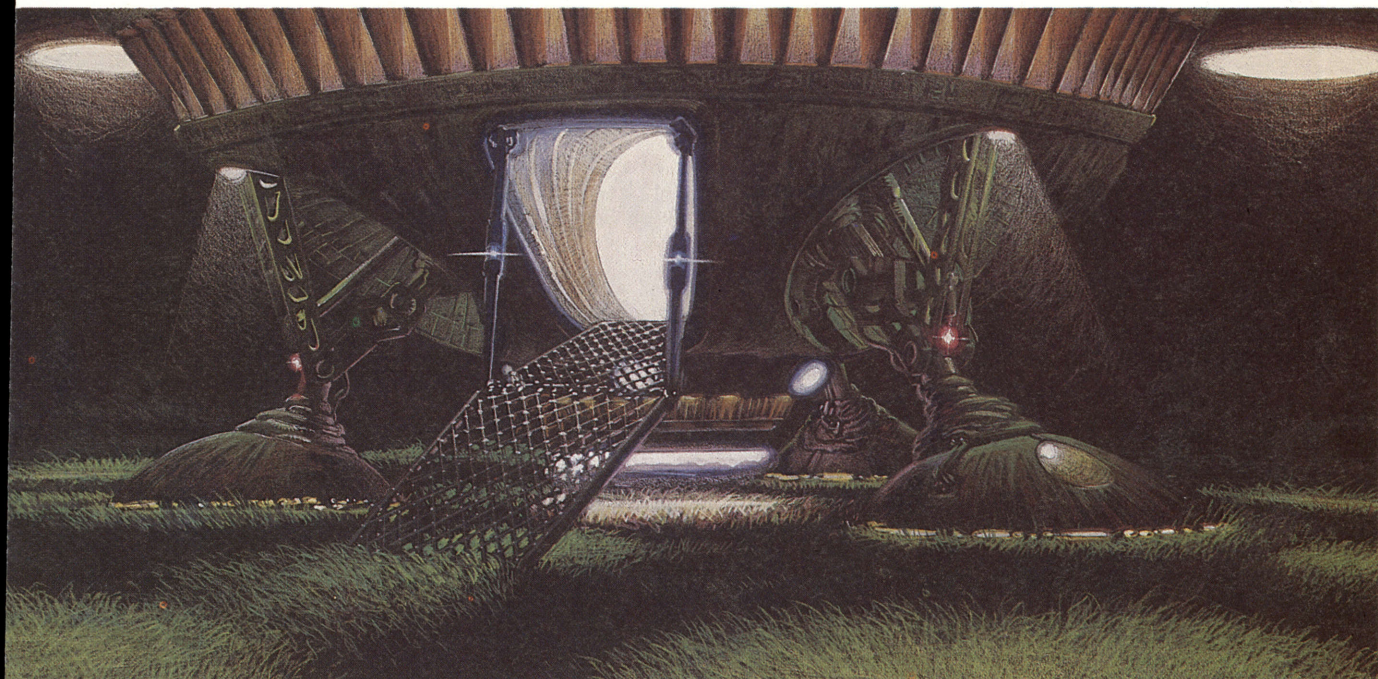
"The set of inside of the van wasn't originally planned for and had to be thrown together quickly."

The landing site of the spacecraft which has the convincing appearance of a deep wooded area, was constructed on a sound stage. Through trick perspectives and the use of artificial fog it was given an appearance of far greater depth than it actually possessed.

"We used trees, rocks and two dumptruck loads of dirt on that set," Bissell says. "Also there were two truckloads of dead leaves, pine needles, pine cones and so on over that, which were as much as one to two feet deep in some places."

"The space ship with the greenhouse was given a definite pumpkin shape. What you see on the screen is all we built—it's the only practical, economical way to do it. We built about half of it and set up the foreground pieces to finish it. We used a





ot of colored lights. A few of the light effects didn't work the way I had hoped so I changed them.

"The greenhouse in the space ship is walled with the same green transparent corrugated fiberglass material that they use on greenhouse roofs, bent to the shapes we needed. Most of the alien plants were hand made, although some few are actual rare

and exotic plants from Africa and other distant places. Those big blooms were formed of polyester blown over an inflated condom."

One of the most painful aspects of working in motion pictures is learning that some of your best contributions to a film have been deposited in the film editor's waste bin. For Bissell this proved true even of *E. T.*, which he

regards as his most rewarding film project to date, but it happened only to one brief sequence.

"It was the school principal's office—certainly not one of the more important sets. The scenes were beautiful, but they were excised from the final release cut. An interesting thing is that the principal was played by Harrison Ford."



The Cinematograph



It is well known in the motion picture industry that any successful picture owes much of its achievement to its cinematographer. This is doubly true if the story deals with fantasy and yet must be presented in a convincing, realistic manner. Such a film is *E.T.*, which has proved to be the most talked about and widely seen theatrical venture of the past year.

Allen Daviau, whose work as *E.T.*'s director of photography has brought him out of near-obscure and into the spotlight, is as nearly a self-made success as can be found in Hollywood. He never attended film school but learned how cinematographers work by "gate-crashing" at various studios and watching his idols in action.

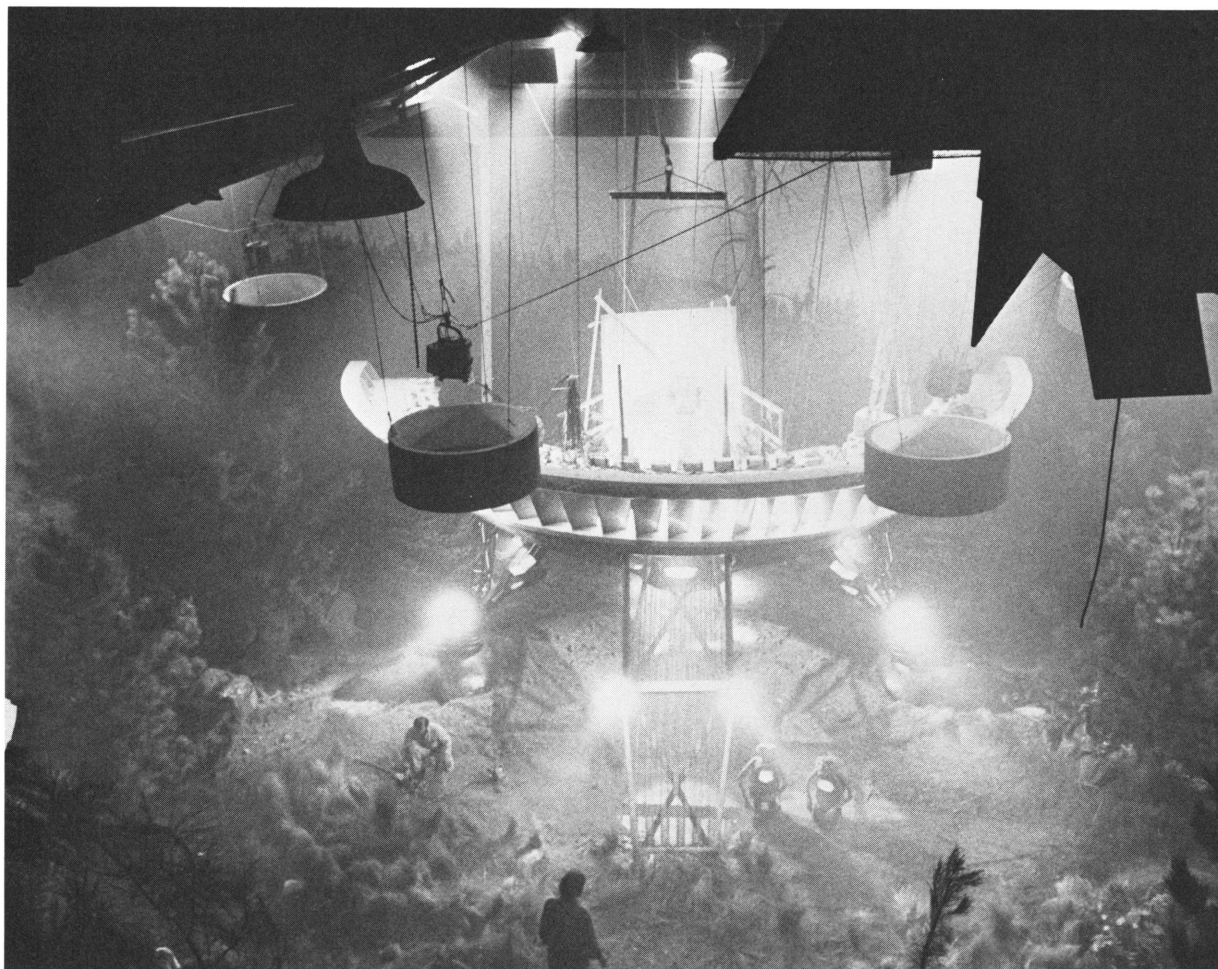


of

E.T.

by LLOYD KENT

(TOP, LEFT) Drew Barrymore's face captures the wonder of a child's reaction to fantastic happenings. (BELOW, LEFT) A sequence in which Daviau pushed the latitude of the film to unusual extremes. (RIGHT) The landing site set being lighted. Fog helps create an illusion of distance in the confines of a shallow stage.



"I was a fanatic about movies and early TV," Daviau recalls. "I watched the last days of 'live' television and marveled at the skill of the cameramen who were able to get so much variety out of a continuing performance. Then I watched Charles B. Lang photograph some of ONE EYED JACKS, and that was even more impressive. I still think Lang is one of the greatest cinematographers of all and I learned a great deal from watching him work."

Born in New Orleans during World War II, Daviau has spent most of his life in Los Angeles. While in high school he learned something about lighting equipment by handling the lighting on several stage plays. Unable to find any kind of job in the

movie studios, he worked in camera stores and film labs, learning all he could about equipment and what it takes to put good images on film. In 1966 he bought a 16mm Beaulieu camera and launched himself as a free-lance cameraman, shooting local television commercials and rock band promotional films for recording companies. Some of these were unusual enough to attract considerable attention. "Sometimes things get done because you're too dumb to know they can't be done," Daviau says. He soon built a good reputation in the commercial field and was assigned as director of photography to many national commercials filmed in Hollywood, New York and Chicago.

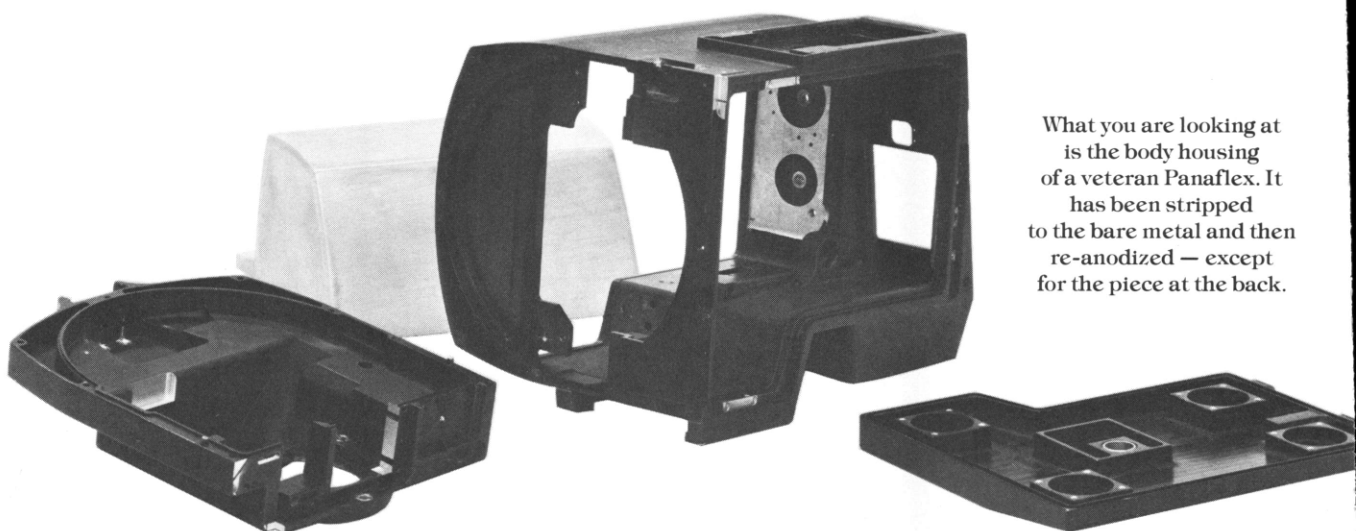
"I still shoot a lot of commercials,"

he says. "They're the mainstay of keeping busy. You always have good equipment and crews, plenty of location work, lots of real interiors as well as studio sets, and an ever-changing variety of subject matter. I like anything that offers interesting lighting challenges."

He also entered the documentary and educational film fields. SAY GOODBYE, which he helped photograph for David Wolper Productions, was nominated for an Academy Award for best feature documentary. His career received a big boost when he did several Movie of the Week features for television.

"Director Jerrold Freedman gave me my first break, THE BOY WHO DRANK TOO MUCH," Daviau recalls.

This is a Panaflex being Updated.



What you are looking at is the body housing of a veteran Panaflex. It has been stripped to the bare metal and then re-anodized — except for the piece at the back.

When you rent a camera from Panavision, it's always totally up-to-date. Our cameras are continually upgraded, so every one is the latest model.

Those body housing pieces are part of a Panaflex that has shot 27 features, 8 television shows and 128 commercials. We know this because we keep work history records on our cameras.

We didn't take it apart because it was worn out. It wasn't. We're Updating it — giving it the latest electronics, finder optics, motor drive and connectors.

Same serial number.
After we put it back together

and test it, this camera will have the same serial number as before. But it will be, in effect, brand new.

Not every camera has to be stripped to the bare metal. But we've had to make room inside for new, modular electronics. That has meant re-shaping some bodies slightly and re-positioning the connectors for better access.

Many changes aren't apparent to the user. For example:

there are heaters with thermostats at various points inside the Panaflex. We discovered that, in very cold weather, the movement could be warm — but the mirror (about half an inch away) could be cold and might fog.

Afterwards, it drew less power.
So we added another thermostat and heater. The camera ran perfectly well before we did that. Afterwards, though, it couldn't fog — and it drew slightly less

power! So that became Scheduled Update, to be built to every camera.

Some ideas come from camera users. We're grateful.

On the other hand, many improvements are apparent to the user. Several were suggested by camera people. Two well-known examples: Panaglow and Panaclear. We're proud of the fact that we listen to you and build what you ask for. We're going to keep on doing that.

The clock-rate story, or Gilding The Lily.

On our first Panaflex, the motor clock-rate was 2.4 kHz. All phase-lock motors are driven by a series of very strong pulses. In the beginning, our motors were hit 2400 times per second (2.4 kHz). That inevitably made a slight whining sound.

"It's running now."

Oh, this, mind you, was the Panaflex that nobody could hear. When it was first demonstrated, people would ask: "How quiet is it when it's running?" and the reply would be: "It's running now."

Good made better.

Nevertheless, we later raised the clock-rate on all Panaflexes to 4.8 kHz — above the human ear's most sensitive region. Panaflexes were already the world's quietest cameras; we found another way to make them all quieter.

State-of-the-art: 12000 pulses/second.

And now we've got it up to 12kHz on all the Golden Panaflexes. At that high a frequency, the sound is

Do we Update all our Panaflexes to become the same model? No. Here's why:

We don't do that because there are three models of the Panaflex, with different rental prices. All three have modern electronics and identical movements. Their viewfinders are different.

On the Golden Panaflex, the image is the brightest and you get better eye relief and less critical eye alignment — plus Panaglow and Panaclear.

The Regular Panaflex has a rotating viewfinder; long

or short, like the Golden model. But the optics aren't quite as fast and there's no Panaclear.

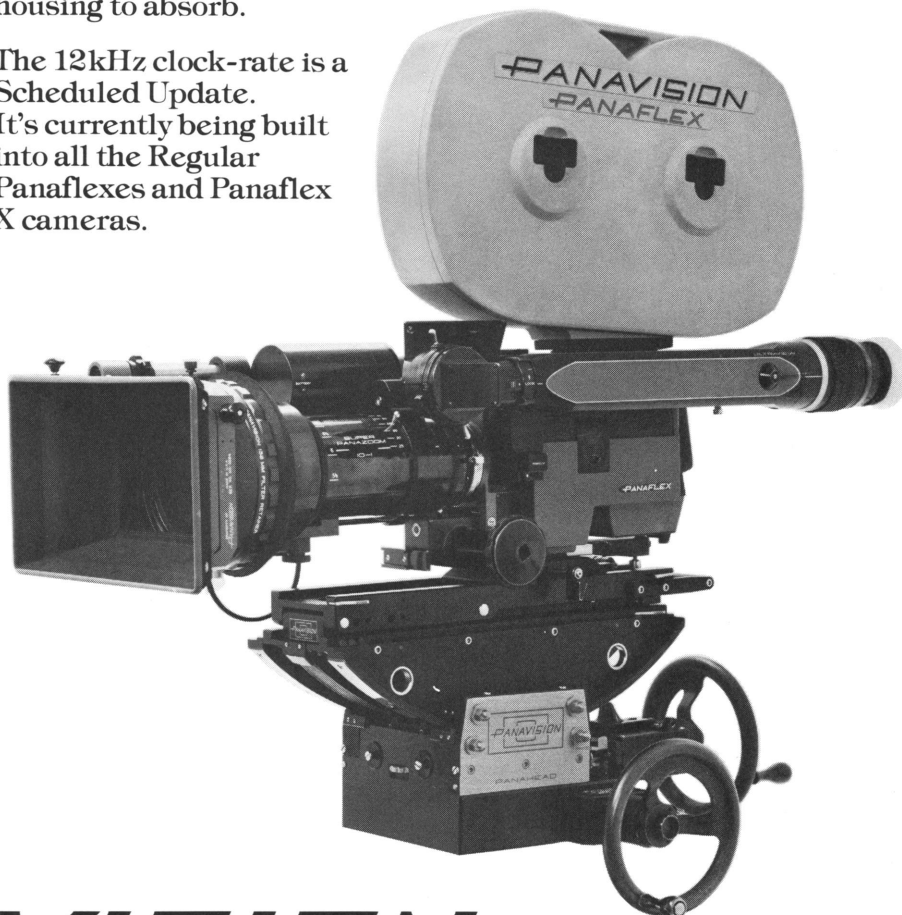
The Panaflex X has a fixed viewfinder (with fast optics) attached to the door. It doesn't rotate; and there's no Panaclear or Panaglow.

Another Update: the Super PSR.

We've made it about 12 pounds lighter and about 6 inches slimmer than our original PSR camera. It has a new, quieter 24V motor mounted on the back. And it has the latest electronics, including built-in video assist and full digital read outs.

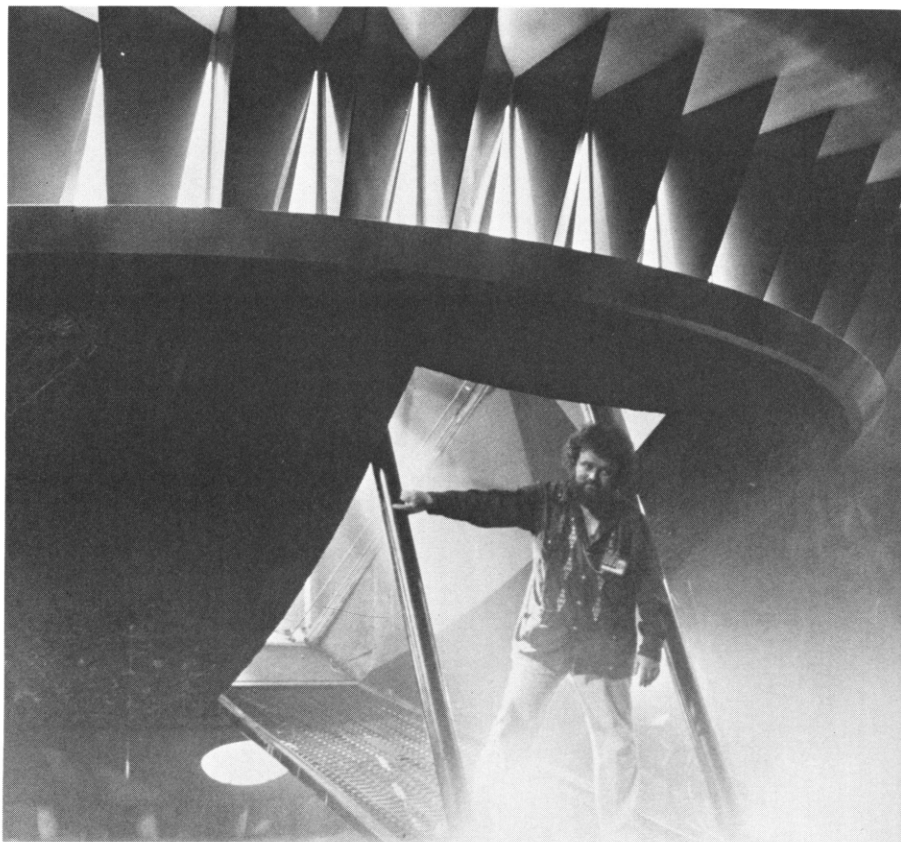
even harder to hear and even easier for the camera housing to absorb.

The 12kHz clock-rate is a Scheduled Update. It's currently being built into all the Regular Panaflexes and Panaflex X cameras.



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Daviau and the spacecraft

"It was filmed on a 19-day schedule and I tried for as much theatrical quality as possible. I think any cinematographer should do that if he's lucky enough to work with production people who will let you go after the 'class' look. When there are limitations of time and money, it's best to get them to let you concentrate your best efforts on the scenes that will do the most good and do the rest more simply. I used the same approach on two other Movie of the Week entries, *STREETS OF L.A.*, also directed by Jerry Freedman and starring Joanne Woodward, and *RAGE*, directed by William Graham."

"Steven saw some of my 16mm work back in 1967 and hired me to shoot *AMBLIN'*, a short subject that started us both up the ladder. He and I shared a great love of movies and tried to show it in this little film, which was my first in 35mm."

"Incidentally," Daviau adds, "Nobody who knew Steven back in '67 is in the least surprised at his success."

The next time Daviau worked with Spielberg was shortly after he re-

Continued on page 85

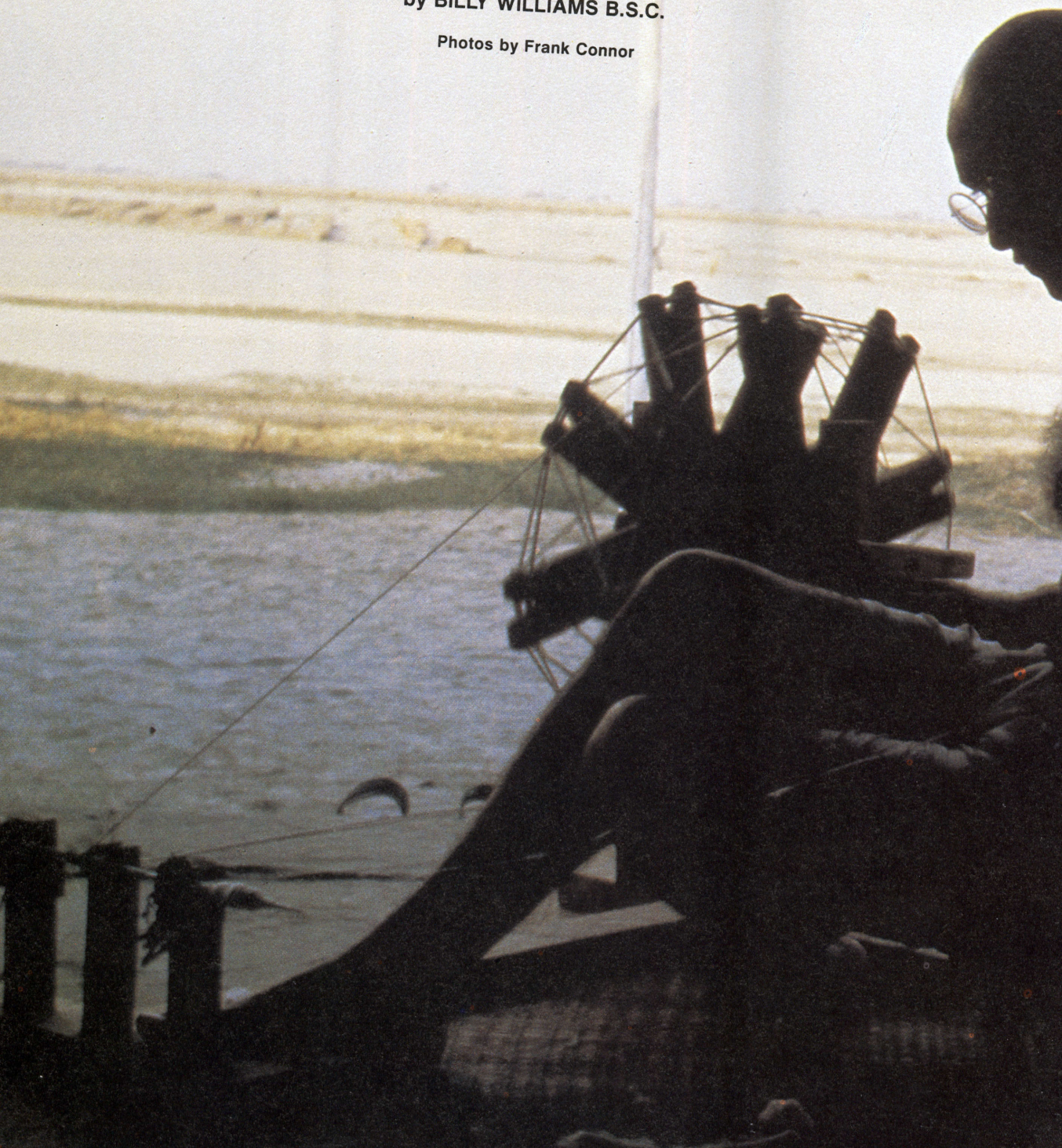
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PHOTOGRAPHING GANDHI

by BILLY WILLIAMS B.S.C.

Photos by Frank Connor



It was on June 24th 1980 that Dickie Attenborough invited me to his house and offered me the cinematography of GANDHI. I left his house armed with a mammoth script and by late that night I had managed to read Part 1. As Dickie was leaving the next day on one of his numerous trips to India I simply cabled "Yes."

GANDHI is the most comprehensive and exciting script I have ever been offered, and the life of this amazing man makes compelling cinema. The script by Jack Briley is historically accurate, deeply moving, and visually challenging. It was clear, after discussion with Dickie that we were engaged in shooting a film which was as truthful as it was possible to be to

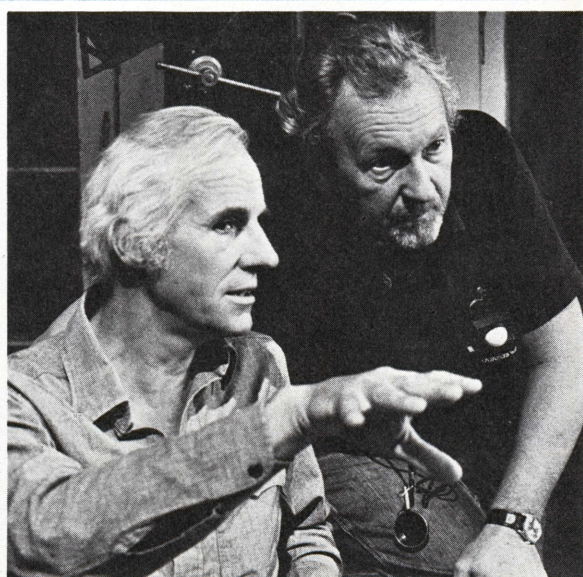
the man Gandhi, and for this reason a realistic style of photography seemed appropriate.

I left for India four weeks prior to shooting which began on November 26th 1980. Much of that time was spent with Production Designer Stuart Craig discussing the plans for his sets regarding the favorable positioning of buildings, backgrounds and, of course, the position of the sun.

This pre-production period was invaluable. I became acclimatized, began to feel the Indian countryside and absorb the natural richness of the locations. I became aware of the many moods of light and considered how best to harness the daylight hours to

suit the needs of particular scenes. Some key long shots were planned for a certain time of day. With persuasion Dickie agreed to change one scene scripted for night to daytime. The location was that of a ruined Mogul fortress extending a mile, with a crowd of three thousand. The change to daylight shooting proved advantageous. We shot from early morning till dusk, the scene culminating in an enormous bonfire of English made clothing. We captured over two minutes of magnificent background which, had the scene been shot at night, would have been comparatively uninteresting.

We used Eastman 5247 exposed at 100 ASA and 64 ASA with the 85 filter



Billy Williams and Ronnie Taylor on the set.



which was developed normally. No diffusion was employed apart from the dust of India, which at times was profuse.

Changes in the weather and the light were tackled as they arose; a tight schedule, although it was 26 weeks, invariably excluded the luxury of waiting for the perfect light.

An enormous Indian crew worked alongside the British key crew. Some of the Indians had previously been employed on Western crews but never on a film of such scale and complexity.

I had been advised to take all the camera and lighting equipment from the U.K. Our gaffer, Alan Martin, made the initial scout alone as I was still shooting *ON GOLDEN POND* at the time. Alan's list of lighting equipment as presented to Tony Clegg, the associate producer was formidable. "We can't possibly afford that," he cried. Compromising, we took about half: two Brutes 2 x 4KW, 6 x 2.5KW and some smaller H.M.I. lamps plus some incandescent gear.

One Genny split into 500 amps DC and 500 amps A.C. enabled us to run the Brutes and the H.M.I.'s from the single silent Genny shipped from England. Occasionally we employed some noisy Indian Gennys and some poorly maintained Brutes. The Indian philosophy concerning maintenance of equipment seems to be that when pieces start to fall off then you *do* something about it! Despite this attitude our Indian electricians were both eager and willing to learn and gave support to Alan, Best Boy Terry Goddard, and Gennyman Malcolm Evans, the only British electricians there.

For day exteriors two 12 foot square reflectors made of the new Rosco Scrim were a great asset. They provided a beautiful soft fill light, at the same time giving enough spread to cover a wide area. Whilst under trees or in heavy shade, I brought out my two lightweight Brutes to fill in a little. The Brutes were useful too at the end of a sunny day to "match in" the close-ups, also in shooting night for day in order to maintain the demanding schedule.

(TOP) Demonstrators led by Gandhi lie down in the face of charging cavalry during protests in South Africa. (CENTER) Rioting Indians burn a police station in the early days of the struggle for independence. (BOTTOM) Gandhi's ashes are scattered from a boat.



(ABOVE) Staging Gandhi's funeral in New Delhi required the recruitment of over 250,000 extras. (BELOW LEFT) Ben Kingsley plays Gandhi and Rohini Hattangady plays his wife Kasturba. (BELOW RIGHT) Candice Bergen was cast as Margaret Bourke-White, the famous Time-Life photographer;

With the Brutes outside lighting through doors and windows and inside the H.M.I. lamps we shot our day interiors combinations with Lee Filters producing a good match. The H.M.I.'s were diffused by Rosco light tough frost, which retains some light direction. By "bouncing off" polystyrene or styrofoam, I achieved shadowless fill light.

The night interiors were lit with incandescent lamps and a combination of hand key light and soft fill. Night exteriors requiring maximum sharpness were obtained by the use of mainly hard directional light being either cross lighting or $\frac{3}{4}$ back light and minimum fill light for greatest dramatic effect.

How invaluable a Chapman crane would have been but shipping costs

and the time spent covering vast distances in India excluded it. The Louma crane flies anywhere, but despite its many wonderful properties, it is not ideal in rugged terrain, dust, heat and wind as we discovered. I sorely missed the dependability of the Chapman.

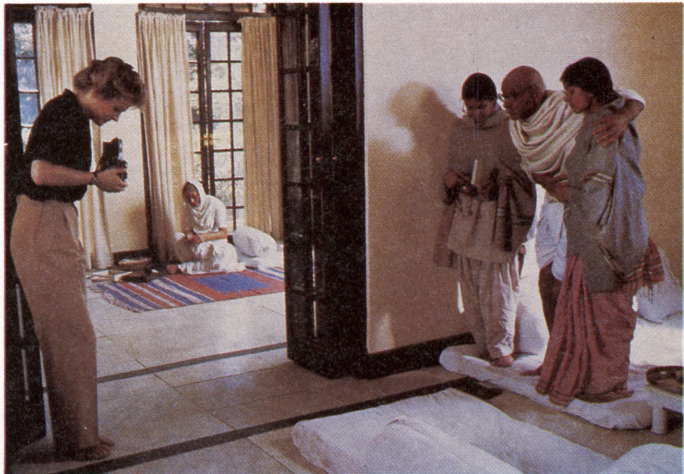
Our key grip, Jimmy Waters, was equipped with a Fisher dolly and an Elemack. We needed an insert cart but were unable to find one purposely

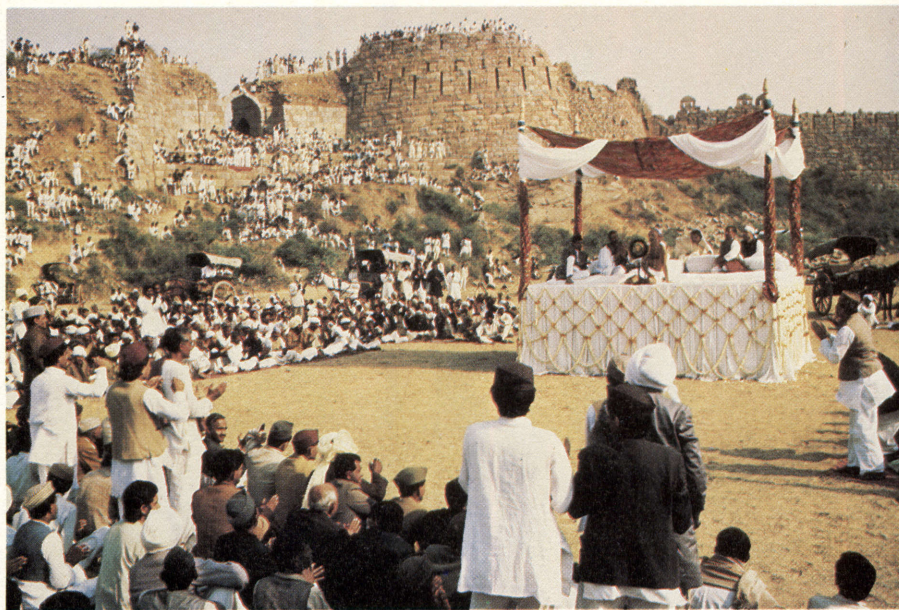
built. Finally we located a little 2 CV Citroen which had belonged to the French Embassy. With the top removed and floored out it performed for a while, but as parts dropped off because of rust it proved more time consuming than it was worth. An Indian engineering firm made an excellent job of constructing a Western dolly, which was fitted with special balloon tires flown in from the U.K.

Our cameras were a Golden Pinaflex, a Panavision X and wild Arriflex cameras as required.

The equipment took a terrible pounding from the rough roads and persistent dust.

Happily the cameras were trouble free thanks largely to the care bestowed by camera mechanic, Nobby Godden.





(TOP) Gandhi appeals to his countrymen to burn their English clothes and wear only homespun fabric in a scene originally scripted for night. (CENTER) Everyone pitches in to get a running shot in the Indian countryside. (BOTTOM) A train wrecked by insurgents is encountered by Gandhi after his return to India.



My camera operator was Chic Arstiss, and Ted Deason and Darrn Shelmendine were 1st and 2nd assistants. They were splendid and I am most grateful for their willing support. Unfortunately I suffered an untimely slipped disc and was forced to return to Landers for treatment.

My thanks go to Ronnie Taylor who filled the breach so admirably and matched the style of photography that I had established. Later I returned to India. Ronnie shot a significant portion of the film and surely merits the sharing of the director of photography credit.

An Indian, 2nd Unit Director/Cameraman Govind Nihalani was responsible for some very difficult exterior scenes including the Partition of India and the Amritsad Massacre. The helicopter shots were done by Robin Browne assisted by Jamie Harcourt.

So many crew members utilized their talents in the making of GANDHI it is not possible to name them all. The large Indian crew who worked so closely with their British colleagues made it a true co-production. Credits and thanks too must go to two others whose names will not appear on the endless list of credits, Sydney Samuelson and Les Ostinelli, whose commitment went far beyond the interests of the services they provided.

Dickie's energy and enthusiasm was an inspiration to us all. He has lived with the idea of making this film of Gandhi for nearly 20 years. The responsibilities and demands on him have been onerous with continuous decision making, advice, handshaking, diplomacy and miles of red tape. There were government officials, police, army and railway personnel to be appeased. There was paper work and rubber stamping at every stage. Graham Ford, location manager, had a great solution to difficult officialdom. For every official rubber stamp, Graham replied with two of his own! It worked every time.

It would be unthinkable to write about GANDHI and not mention Ben Kingsley who plays the Mahatma. Ben at 36 years old is Gandhi, from 28 to 78 years of age. His commitment and characterization in this role is quite remarkable. Many times I would offer "old man Gandhi" a seat between "takes," he was so frail and spent. Ben would smile gently through Tom Smith's fine makeup and decline with a characteristic Indian inclination of the head—a catching habit we all adopted.

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OF PANTHERS ... WILDERNESS ... AND OTHER TECHNOLOGIES

by Robert Primes

Shooting slow motion matte shots of the black panther required over 300,000 watts of lighting even with 5293 rated at 740.

Once upon a time there was a man who had a vision. The man's vision involved things he loved: mountain climbing, flying, skiing. In his vision he saw images; images that flowed into each other—seamlessly—fluidly. The man's name was Michael Grunstein.

There was at this time another man who lived in Mexico. This man also loved the wilderness and adventure and he also loved black panthers. He put the symbol of a black panther on the label of every bottle of brandy he made. He also used the panther in wilderness in all the television commercials for that brand of brandy, 'Etiqueta Negra.'

Michael was asked to design and direct five 60 second 'Etiqueta Negra' spots and he asked me to photograph them. When I first saw the beautiful color storyboards I realized that we were going for poetry, for visual music. I had waited for an assignment like this for a long time. There were fast, low flying shots in the desert, skiing shots, rafting down rapids, and panthers appearing and disappearing like apparitions from "The Teachings of Don Juan." One particular image combined a desert time-lapse sunset under a gigantic full moon with an abstract outline of a brandy snifter and a

huge close-up of a snarling, roaring panther emerging from inside. We wanted to make unusual images and we would need some unusual techniques to do that.

THE CAMERA

Arri IIIs were used because they are light, compact, rugged, almost weatherproof, have excellent registration, and have a 4 to 128 fps speed

range that Clairmont Cameras has extended into the time-lapse range. They will also handle the 9.8mm lens. This lens has had a poor reputation among cinematographers for mediocre sharpness over the image plane. In truth, the optics themselves aren't bad. It's the mount that's been the culprit. Denny and Terry Clairmont have imported an English stainless steel mount that holds this lens solidly

Cameraman Primes with the remote control board which enabled him to alter camera speed and aperture during a helicopter shot.





Frames from one of the edited commercials involving helicopter shots, time lapse, animation and electronic matting all combined with special effects and dissolves in video editing. The frames were photographed from a monitor with digital frame storage by Complete Post Production Center.

in its ultra critical position. To the best of my knowledge, the Clairmont brothers are the first ones to get the Arri III to do time lapse. Shutter speed is a fixed $\frac{1}{3}$ second and the interval is whatever is set on the intervalometer up to a maximum of one frame every two seconds. There is also a way to rephase the motor and shutter to get an intervalometer determined exposure time and a fixed $\frac{1}{3}$ second pulldown between exposures. There is a green and a red warning LED in the Arri finder. Both of these must be disconnected or you risk fogging the film at longer exposure times.

For our helicopter shots, we were using the relatively new "belly mount" devised by Nelson Tyler with both our Arri IIIs facing forward and mounted very low on the Cinema Air Jet Ranger III helicopter. This mount was designed to hold up to three Arri-sized cameras and to smoothly tilt from straight forward to slightly past straight down. One of the effects we called "hyperspace" because it involved skimming over the ground so low, so wide and so fast that the lower part of the frame evolved into a slit scan-like abstraction. We used the well-mounted 9.8mm Kinoptik on one

camera and a 16mm Zeiss Distag on the other. In addition to the very sensitive Tyler-supplied joysticks tilting up and down (panning was done entirely by the pilot panning the helicopter), the camera with the wide lens was fitted with a video tape and monitor was rigged inside the cockpit. Both cameras had remote start/stop switches, remote speed controls and remote, servo-motor controlled iris—all designed and built especially for this production by Clairmont. We were actually able to change speed and ride aperture in mid-shot. Our pilot was the legendary Ross Reynolds. Ross, a charming, white haired, smiling elf, reassured me, "I didn't get too old by being brave!", and then almost scared my hair white by flying full speed into a box canyon and at the last possible second averting destruction by banking over into a breathtaking 180 degree turn which left me speechless and quite dizzy. We also got a stunning, undercranked shot actually flying *through* a natural arch in Utah. We did have one flaw in what was otherwise a fine collection of beautiful and exciting helicopter footage of Monument Valley, Canyonlands and Dead Horse Point in Utah. A vibration in the belly mount at certain tilt angles cost us some of our best footage. Fortunately, there was still plenty of footage for the commercials.

WHITE WATER RIG

One of the effects we visualized for the white water rapids commercial was a point of view shot of the rapids actually engulfing the camera at speeds up to 128 frames per second. Naturally, we wanted to use our rugged 9.8mm for this p.o.v. shot. The only problem was that apparently no one had ever tried to use such a wide lens with a spinning spray deflector. The solution came from Mike Ferrara, the inventor and supplier of the spray deflector. Mike most graciously rebuilt one of his deflectors so we could use it with our ultra-wide 9.8mm lens. Ken grip Ken Wheeland did an excellent job of rigging camera and spray deflector safe from the tons of water that would soon engulf them. I fell into the river only once, wearing two spot meters and a Spectra.

FILTRATION

We found a combination of an 85, coral 2, and a polarizer seemed to bring out the rich reddish gold of the

Continued on page 7

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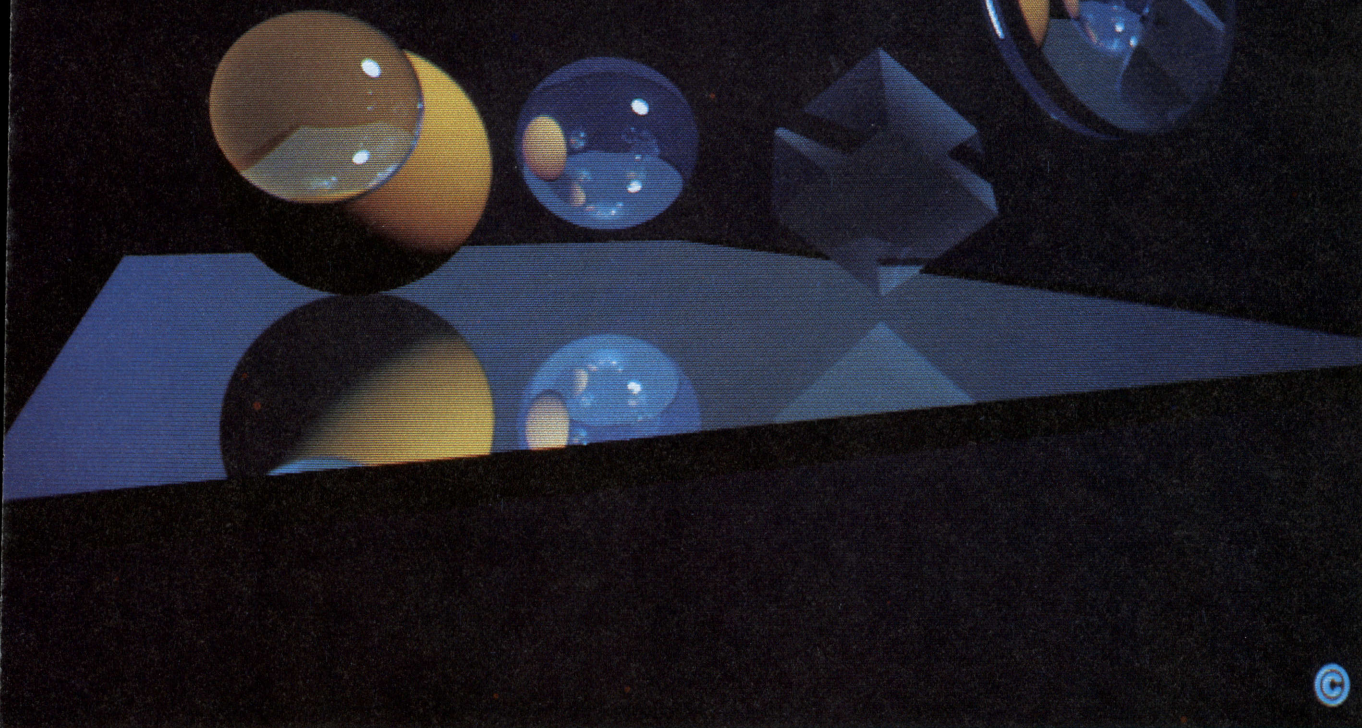
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MOVIES, COMPUTERS AND THE FUTURE



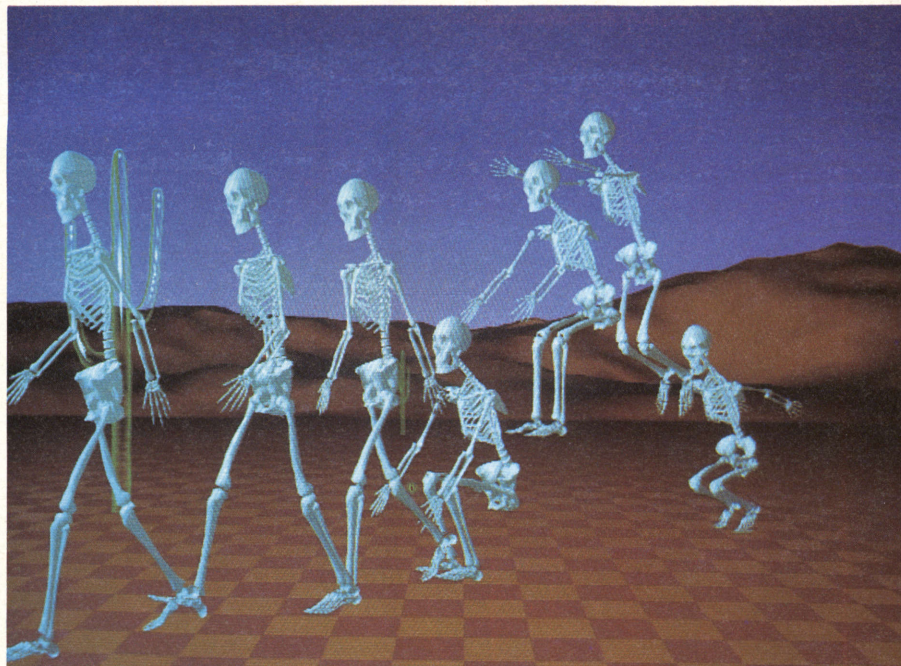
by PETER SØRENSEN

"Refractions" by Robert Conley of Cranston/Csuri Productions shows with stunning clarity the optical properties of different materials. The paths of light rays are calculated backwards, from the imaginary camera, to the objects where the refractions and/or reflections take place, and then to the light source.

As the cost of location filming inevitably escalates in the coming years, the cost of computer graphics will inevitably drop. The hardware is getting both cheaper and more powerful, while the software for generating the images becomes more sophisticated. We will soon see computer generated imagery used routinely in all kinds of films, not just for spectacular special effects. At the same time, the imagery is changing from the sanitary, airless, mechanistic look associated with computers, to the natural. Mountains, oceans, gardens, even animals and people will be possible before the decade ends. The microelectronic revolution is surpassing the industrial revolution in both the speed and breadth of the cultural and tech-

nological changes it brings. This impact has begun to be strongly felt in video of course, and the handwriting is on the walls of the motion picture studios. The problem is that the movie industry is very conservative when it comes to new ways of doing things (an understandable survival tactic in many situations) and prior to TRON, has shown near zero interest in computer imagery, so all advances in computer imaging have been made by people in other fields, such as educational institutions and the automobile and aircraft industries. But, that is changing. If you shake a person hard enough they will wake up, and the movie community is stirring, to find that the early birds are already busy.

Without getting bogged down in technicalities, a brief review of what makes computer graphics tick is in order. How does a big box full of electronics produce a photographic image that looks like a real scene? The objects in the scene must first be described to the computer by the user with one of several methods; the most frequently used is point by point plotting on a sort of electronic drafting board called a data tablet. The object, a car for instance, is drawn in front, back, top, bottom and side views so that the computer gets a geometric description of the object formed in its memory. Alternatively, the object might be "built" out of primitive shapes, much like playing with a set of electronic blocks. One



(TOP) The action of this "Jumping Skeleton" was accomplished with a program involving artificial intelligence which was developed by David Zeltzer at the Computer Graphics Research Group at Ohio State University and data generation by Donald Stredney of Cranston/Csuri Productions. (BELOW LEFT) Rugged mountains generated by Loren Carpenter when he was at Boeing virtually grew themselves based upon a fractal program that randomly placed the features. (BELOW RIGHT) "Bill" © 1982, by David Em with computer software by Dr. James F. Blinn.

way or the other, all the elements of the scene are fed into the computer and then the computer must be told the point of view that the "camera" is to have, the location of the "sun" and even the kind of "lens" (wide angle, telephoto, etc.) to be simulated. Finally, the motion of the objects must be decided upon, and this is entered into the computer via the keyboard, with a description of beginning and end points, accelerations, and so forth. By now the computer has the scene in its mind's eye, as it were, and it's ready to do a low-resolution test on a video screen for the user, and then if all is perfect, it can begin the actual computation of the high resolution image which it will scan onto the raw film stock. The film is

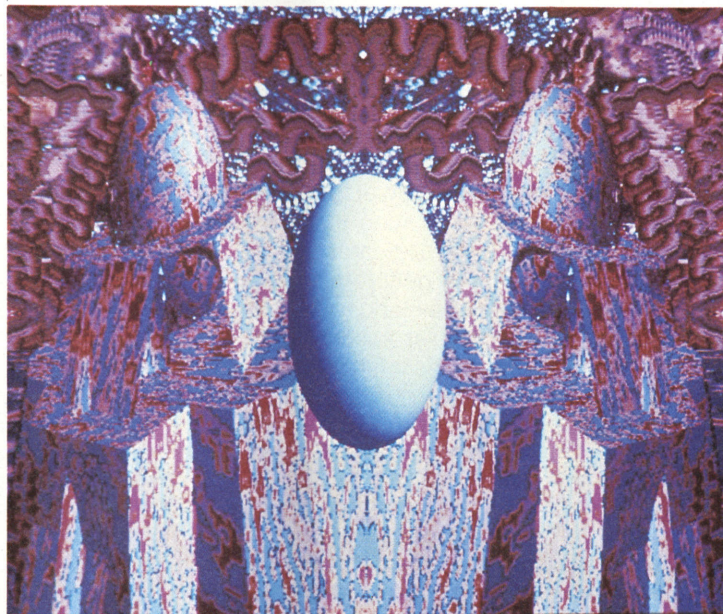
scanned with light from either a cathode ray tube or a laser, drawing thousands of lines (known collectively as the raster) each of which has thousands of tiny points along its length (called pixels) that are calculated for brightness and color according to the scene being synthesized. For every one of the millions of these pixels in the frame the computer must decide what is seen in that particular tiny spot, what color it is, how much light is on it and so forth.

Oddly enough, one of the more difficult tasks the machine must accomplish is to sort out which objects are in front of which, because the computer has a sort of God's-eye-view of the scene, seeing everything at once with equal importance and in all perspec-

tives. Ultimately, the image is synthesized based on formulas that describe how light reflects off different surfaces when passing through transparent materials, how light is dimmed by distance, and even the interaction of reflections on shiny surfaces and shadows cast from one object to another.

Obviously, it takes a lot of computation time to make a picture (between three and fifteen minutes per frame is par for most systems) and at 24 frames per second it takes 1,440 times longer to make one minute's worth of film. It's not hard to see why, as a rule of thumb, one can expect to pay up to \$3,000 per second for finished product. But none of the companies involved is exactly proud of the high cost of image synthesis, and they are all constantly seeking to improve their systems to get higher speeds, at the same time as they go for ever more sophisticated imagery.

There are two very different approaches to the cost effectiveness problem, and herein lies the drama that is shaping up in the industry right

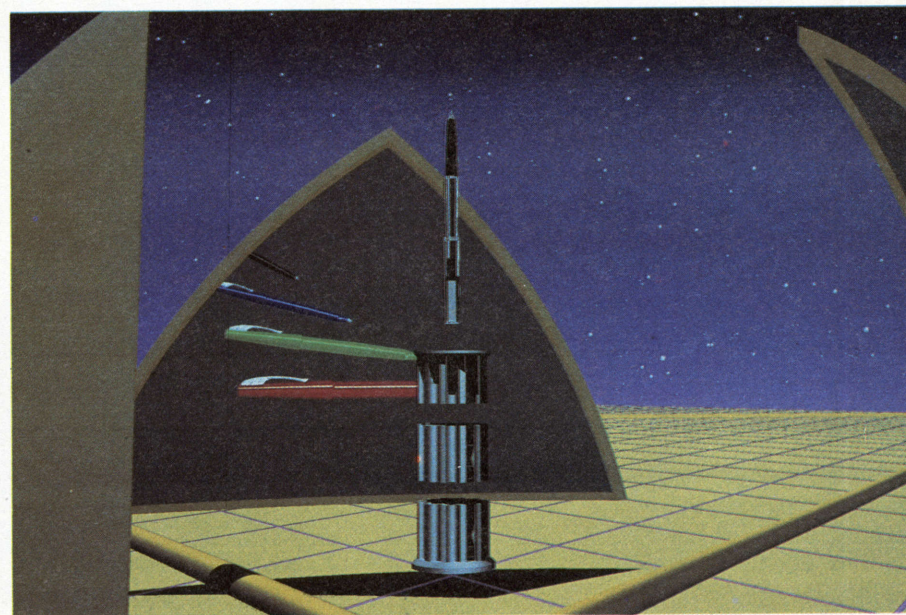
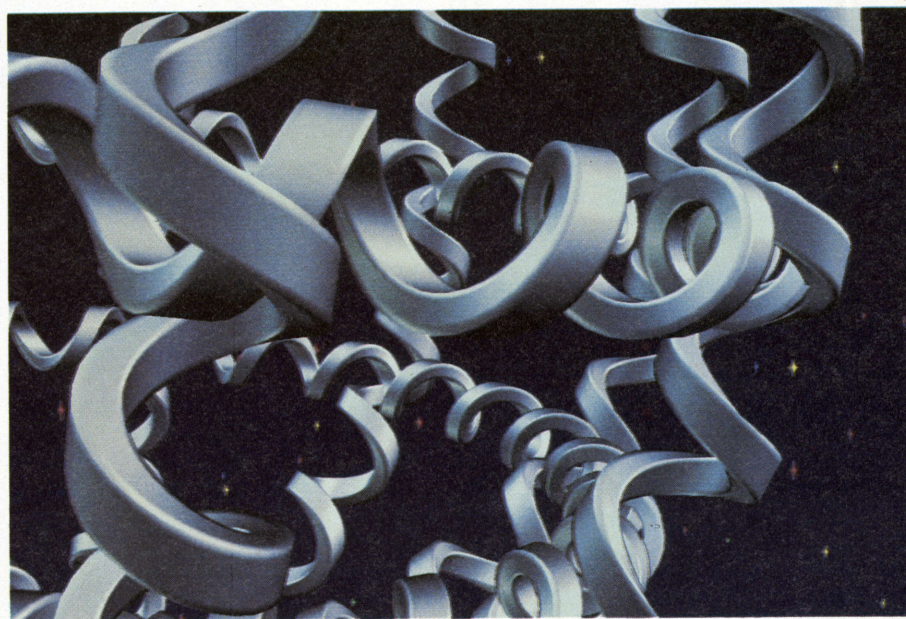
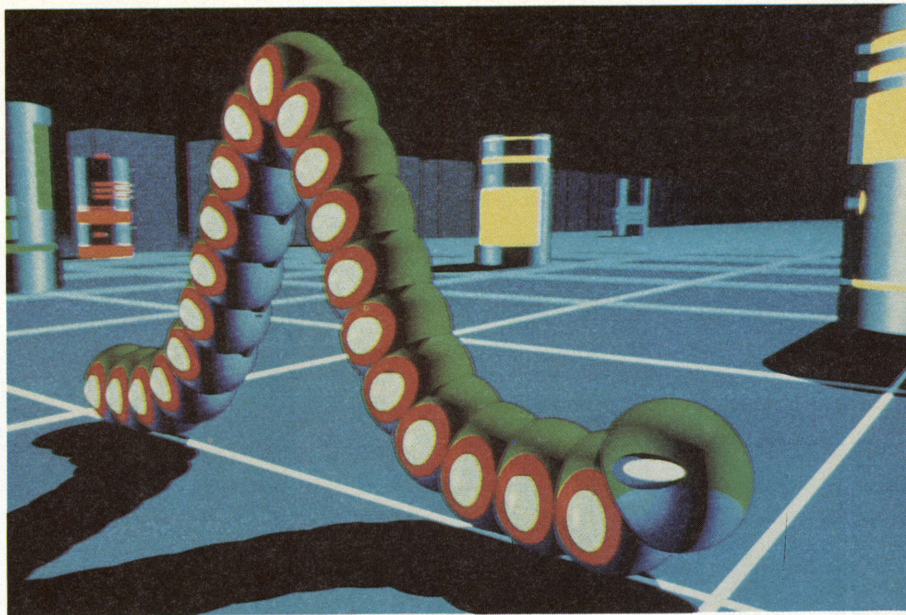


ow. One camp is betting on software and the other is betting on hardware. The software approach requires a very powerful general purpose computer than can simply run the graphics programs very fast, while the hardware approach involves designing a relatively small computer that is "hard wired" to solve imaging problems with a minimum of programming.

John Whitney, Jr. and Gary Demos exemplify the former approach with their mighty Cray computer at their company, Digital Productions in Santa Monica. John and Gary essentially introduced digital computer imaging to the motion picture industry in the early 1970's with a handful of special effects sequences they produced for WESTWORLD and its sequel, FUTUREWORLD, at Information International, Inc. (triple-I). Today they are revolutionizing the scale of the business, making it possible to do the scenes for entire feature length films with their Cray computer. Crays (there are only 40 in the world) are generally regarded as the most powerful machines in the entire computer industry, and the 6.5 million dollar Cray 1S/1000 at Digital Productions is the first to be devoted entirely to scene simulation. It will not be alone for long, as it will be joined by another later this year, the Cray X-MP, which is roughly twice the price but also five times as powerful. With these mighty computing engines the company will be turning out high resolution (4,000 x 6,000) frames containing shapes with over a million polygons (a measure of scene complexity) in scant seconds. Because the Cray is a general purpose machine, they are not locked into any one type or style of imagery. Software can be modified for a particular job, it's very flexible and so experimentation is facilitated.

"One of the facts that really became clear to us," Whitney says, "was that in order to operate profitably and produce simulation that didn't look like it was computer generated, we needed to have a fairly powerful computing capability that would allow

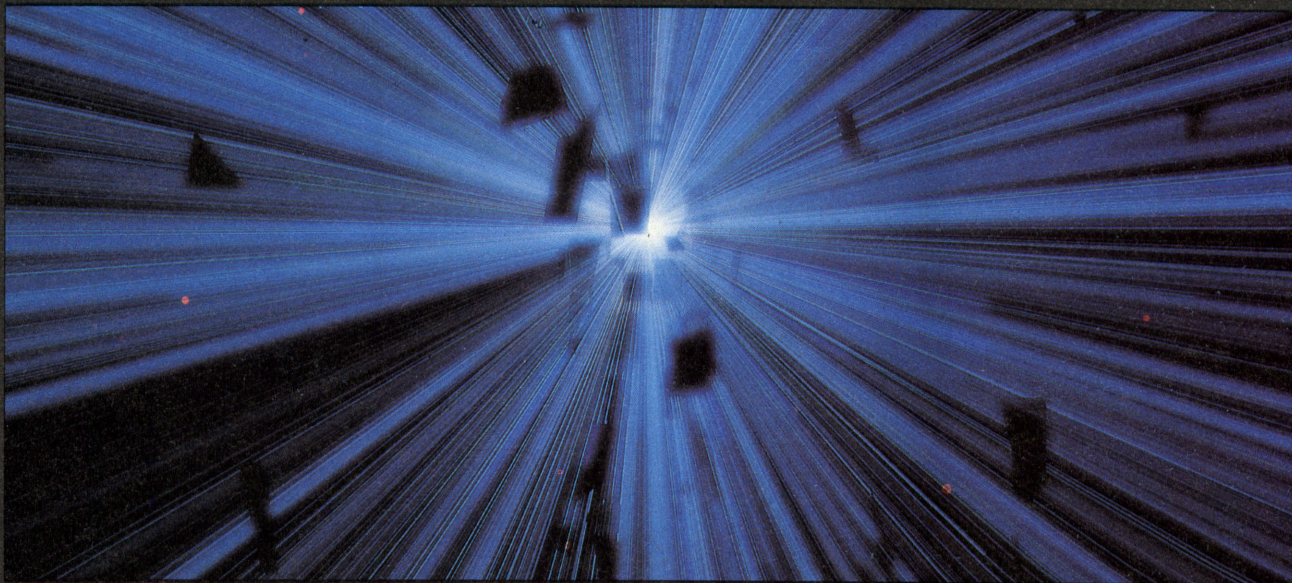
(TOP) The worm from the commercial for a video game called *Worm War One* created by MAGI/Synthavision with art direction by Richard W. Taylor. (CENTER) A portion of a globe formed from coils of telephone wire as part of an animated logo for AT&T, synthesized by Digital Effects Inc. (BOTTOM) The Pentel commercial created by the Cineflex division of Pacific Electric Pictures, Inc.



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The effect of anti-aliasing on the rendition of diagonal lines can be seen in the right hand image. Anti-aliasing can be used to improve the appearance of lower resolution images, but even high resolution systems benefit from anti-aliasing techniques.

s to produce film quickly and with great scene complexity—scene complexity being the key to computer scene simulation which suspends the audiences' disbelief. We chose the Cray computer because it's a very dependable computer that operates at the kind of performance levels we're interested in. It's a pleasure to work with this machine, it's up all the time, it's like the Rock of Gibraltar!

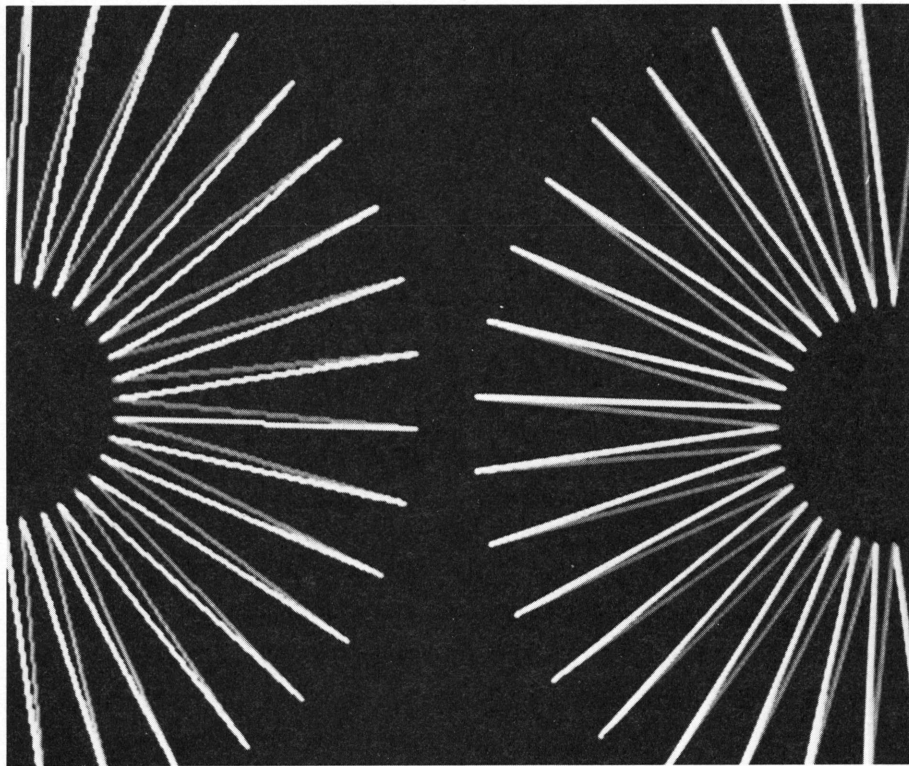
"Philosophically, because of the creative nature of simulation, from one project to the next you can never know all the things that you are going to have to do, so it seemed that we should always go with general purpose computers and general purpose software. This allows us the most flexibility in accommodating all the nuances that come our way in this creative business," Whitney adds.

"We are giving filmmakers interactive work stations with high resolution PDP-11 digital video preview monitors hooked into the Cray that are, in effect, interactive shooting stages where they can rehearse scenes with fully shaded images in real time."

Digital Productions has already cut its teeth on a few jobs including footage that is being used by Devo (a new wave band) for projections during their latest concert tour. They have also produced lots of test footage for their first feature film *STARFIGHTERS*, which they are doing for Lorimar Productions. The production design of *STARFIGHTERS* is in the hands of Ron Cobb (*CONAN*, *ALIEN* AND *RAIDERS OF THE LOST ARK* are among his credits) who is making exciting use of the stylistic possibilities of the computer in designing of outer space environments.

LUCASFILM

Meanwhile, up north of San Francisco in San Rafael, Lucasfilm's Computer Development Division is working on the totally different, hardware approach to image making. The team there is headed by Ed Catmull, who believes that specially designed machines can be built which can



make pictures with a lot less calculating work, and that translates to less time and money. They also expect to be able to build the computers fairly inexpensively, so it will be possible to have several machines available at once for different jobs, although the R&D stages will take at least another three years. The basis of the hardware approach is that graphics involves lots of repetitive operations that never change from one job to the next (finding light values on shaded areas, for example) which would normally be done with software by making the same calculation over and over again, millions of times per frame, taking up considerable time. But it's possible to "hard wire" a circuit to do the same job automatically, sort of without thinking about it, eliminating almost all the calculation time.

The machine being built at Lucasfilm is called the PIXAR. "We have a license to build the best machine we can imagine," said Loren Carpenter, one of the key people on the team, "That machine will make computer animation dirt cheap, like a dollar a frame." (That refers to computer time alone, total production cost will be reflecting several additional factors!)

"We start from the position of recognizing how exceptionally difficult it is," said Ed, "not kidding ourselves. The next step is to think about doing the impossible, how would we do that? What kind of machine would

provide us with that kind of performance?"

One of the things that a hardware-type system would be able to do very well is speed things up by employing anti-aliasing techniques, permitting lower resolution images to be totally acceptable, by eliminating the jagged lines and edges (aliasing). Anti-aliasing is time consuming when done with software calculations, but lends itself to specialized hardware. It turns out that even very high resolution images suffer if they don't have anti-aliasing, because tiny details in the picture tend to strobe as they move, windows in a city skyline scene for instance, during a zoom, would start flashing off and on when they got down to pixel size. The PIXAR will take care of that. It also will be capable of super-high resolution, if required.

Ed frequently emphasizes the commitment to creating high quality images. "We have a certain philosophy and set of rules that we had to adopt, one of the rules is that you don't show things to people unless the picture is perfect. Jaggies are one example, the rule is you don't make pictures with jaggies in them—you just don't make them in the first place." Another way they are striving for quality is in their research and construction of a laser film printer which will produce exceptional color fidelity, thanks to the purity of laser light.

Computer animators in general and

the Lucasfilm Computer Development people in particular have a problem with respect to the fears of people in other parts of the special effects industry who feel their livelihoods may be in jeopardy. By the end of the decade that might become a problem except for the fact that by that time most of the conventional special effects people will have long ago gotten involved with digital imaging themselves. The machines are becoming more and more "friendly" every day and their ever more exciting possibilities will become very hard to resist. Nevertheless, there will surely always be people who like to make models and experiment with pyrotechnics, and there will be things they do better, or more efficiently for a long time to come. Besides, the digital imagers aren't looking to replace anybody or do what has already been done, they are itching with the pioneering spirit to conquer new and different horizons. "We are trying to make more tools available to give filmmakers a better control over reality." Says Ed, "We are extending the repertoire. The idea is that we will make an element and the people at I.L.M. (Lucasfilm's magical model makers) will make other elements. So we will have joined forces."

Alvy Ray Smith who is the project leader for graphics in the computer development division, said that the people within their division work to-

gether harmonically, and he expects that harmony to extend to projects involving I.L.M., "We are a team effort, I like to think of it like we are a rock and roll band—we each have our own instrument to play."

The Lucasfilm Computer Development Division also encompasses digital sound techniques, editing and even games (in connection with Atari, a company that is itself mouting a powerful graphics research effort and will do work for SUPERMAN III.) The graphics team in addition to Ed, Alvy and Loren, includes Rob Cook, Tom Porter, Tom Duff and Bill Reeves. They would like it known that they need to spend the next three years in seclusion to do their research before they take on any more work from the outside world. (They did their spectacular "Genesis" planet terraforming sequence as a sort of teaser, to validate their long term goals.) So even George Lucas will get nothing but test images from the team for a few years (carefully anti-aliased, no doubt).

DIFFERENT APPROACHES

The difference in approaches taken by Digital Productions and Lucasfilm epitomizes the difference between the software and the hardware approaches to the computer graphics drama. Of course, each involves some of the other—you don't have computers without programs—but

the differences are profound and there is a life-and-death, evolutionary drama taking place, make no mistake. It's been going on since computers were invented, actually, and each of the companies doing computer imaging has to balance the advantages and disadvantages of software vs. hardware. It just seems that imaging technology emphasizes this dichotomy. We can look beyond the entertainment industry to the computer aided design business (which is software intensive) where they are using computer graphics to design everything from satellites to cars, with highly adaptable systems, or we can look to flight simulation (which is hardware intensive) where pilot training requires only a few kinds of images but it requires them fast, as with the Evans and Sutherland CT-5 which generates 50 frames per second for fast action realism.

At Boeing (where Loren Carpenter worked before he went to Lucasfilm) they are putting together a hardware type system that will be light enough to go into a small plane and provide real-time scene simulation of the terrain below the aircraft for the purpose of radar-less navigation in hostile territory. Such specialized systems as this lend themselves well to hardware solutions.

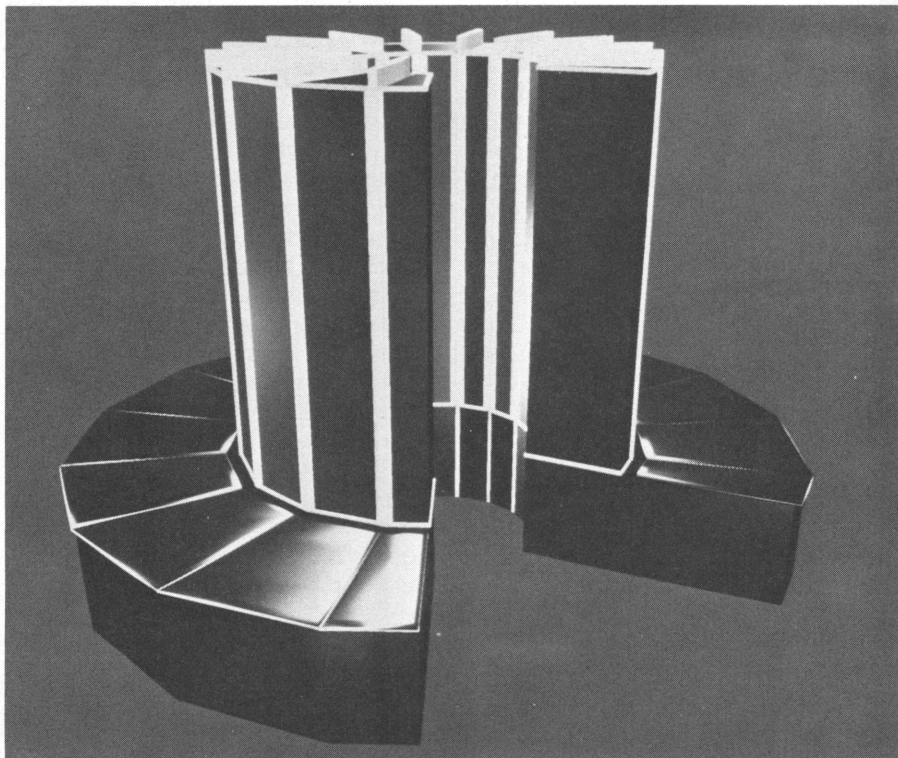
The requirements of computer aided design systems are much more variable. When engineers tackle the complexities of automotive design (or whatever) they want their systems to be software orientated, so they can do different tasks easily and go off on tangents when the mood strikes them. Software is easy to make changes on, compared to hardware.

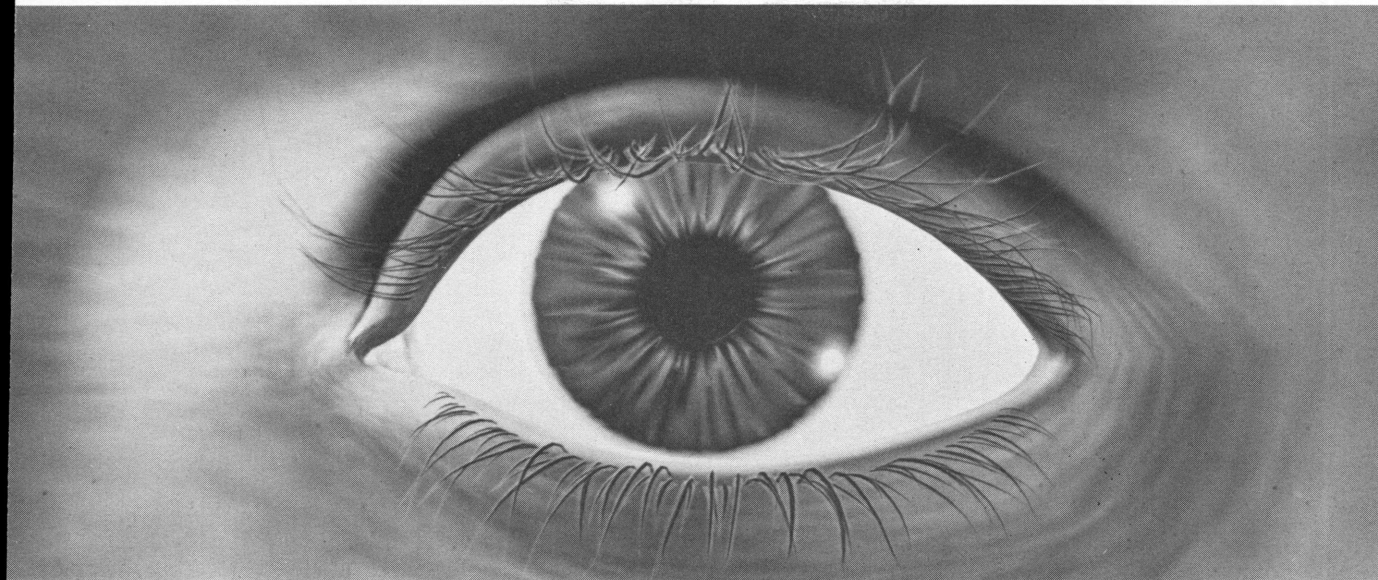
As far as computer imaging for film and video is concerned, the software/hardware dichotomy has been dealt with in different ways by every company in the business. To some extent every company has worked on their own special software and they have all at least tinkered with their hardware.

MAGI

One outfit that has done more than a little of both is MAGI/Synthavision

A self-portrait from the Cray 1S/1000, a \$6.5 million computer now being used for graphics work by Digital Productions. Digital scene simulation by Digital Productions © 1982 All rights reserved.





eye synthesized by Triple-I for a sequence in Kodak's "Magic Journeys" in which the camera moves through the pupil. Art Durinski and Larry Malone were the art directors and William Dungan, Jr., the technical director.

the first company to create movies by digital computer way back in the 60's. Headed by Dr. Phillip Mittelman, they began by tracing radio-active rays through environments, and to their pleasant surprise they discovered that the same programs could simulate light rays, with only minor modification. Over the years they did work on educational films, medical animation and effects for commercials. And MAGI slowly grew, hoping for an opportunity to really cut loose, which they did in TRON with gusto (remember the tanks and the light-cycles?)

As they continue to evolve their dependable imaging system, they are looking for new directions. MAGI is perfecting a process called Synhamation, whereby they will work together with hand animators to produce a hybrid of computer and hand animation. More than just an electric paint set, the computer will solve the complex dimensional perspective problems in the scene which the animator will then digitally roto-scope (trace). The computer then finally goes back to add shading and highlights to the images, so they won't look flat.

MAGI has recently opened a Los Angeles division which is headed by Richard Taylor (co-special effects director for TRON.) As of this writing they have already done work for several commercials which involve mixtures of fantasy graphics with computer games.

Taylor says, half Jokingly, "Reality is only the most popular fantasy. Maybe in the future the most popular fantasy will become computer generated reality." This can be both a promise and a warning. We must be as conscious and responsible of how we shape this new art form, as Gutenberg was in his day . . . maybe more so. The ghost of Marshall McLuhan surely is watching the growth of computer generated imagery very closely!

N.Y.I.T.

The relationship between medium and message has surely been given some thought by Louis Schure and the people working under him at the New York Institute of Technology's Computer Graphics Laboratory, where many advances in the state of the art have been made over the past seven years. Considering the fact that computers render geometric surfaces best, N.Y.I.T. is making a movie that will take advantage of that, it's a story about robots, called THE WORKS. It is an extremely ambitious project for one facility to undertake, and Lance Williams who is in charge of the project, admits that it's taking much longer than expected, but it's going to be worth the wait. Excerpts from the film show that not only is it very sophisticated technically, but the writing and art direction are hot and well suited to the medium.

"We have taken the mass memory angle," said Lance, "which permits us to use a sort of guerilla warfare approach using a large library of special programs which can operate on the same data base, as opposed to the

approach of using one very large program which does everything. Our methods are very flexible. We have a special purpose computer that plugs into the buss of the main C.P.U. that really makes the bits whiz!" So they are deeply into both hardware and software.

Although this article is really only concerned with computer graphics that simulate reality, we should mention two companies that, while they do some simulation, are best known for the digital cartoon animation and painting systems. Computer Creations in South Bend, Indiana, has a system called VideoCel which was used last year to do an award winning short subject under the direction of British animator John Halas. The beautiful ten minute piece is called DILEMMA, and was produced from start to finish in under two months. Acmecartoon, for its part, boasts several kinds of tricks in their bag, including an image processing technique called Emulsifilter which gives a film look to live action video, by subtly altering the color and contrast, and introducing a subliminal flicker.

PACIFIC ELECTRIC PICTURES

Image processing is a very exciting area of computer graphics that is being put to use by Pacific Electric Pictures in Los Angeles with their digital compositing system. They are a new company best known for their totally computer generated Pentel commercial that aired last fall. They really specialize in software; they have several kinds including both polygonal point to point rendering, and geometric solids modeling, which they

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can combine in a single scene (that's something like mixing oil and water). P.E.P.'s President Steven Kahn says this gives them the ability to model just about any kind of shape, "Being given the task we can look at the problem, decide what you want to see on the screen and decide which of our software packages are most applicable and the least computationally consumptive." On the sleek look of the Pentel ad he said, "Computer generated imagery creates a novel atmosphere which will keep people from going to get a beer, which they often do when Mr. Whipple comes on!"

DIGITAL EFFECTS, INC.

A company in New York doing a lot of commercials these days is Digital Effects, Inc. They also did a "bit" of work for TRON. They recently did a dramatic logo animation for Bell Telephone that showed a coiled phone cord in the shape of a globe, zooming back. Other spots include Pirelli, GE, Goodyear, Scientific American and many others. They have also done openings for the NBC Nightly News and CBS Sports. Their president is Judson Rosebush, who is also the guiding force in their system's design.

On the West Coast certainly nobody has been doing scene simulation longer than triple-I, from WESTWORLD to TRON, and beyond. They recently did several scenes for a film called MAGIC JOURNEYS, that is now at the Kodak Pavilion in Disney's new EPCOT Center. These scenes were generated in stereo pairs for true 3-D projection. (Computers can easily generate stereoscopic images by depicting a scene from two slightly different perspectives. The data base required is the same whether you want stereo or not, and this has led to a serious confusion in terms, since programmers refer to any computer graphics that involves perspective as "3-D." How unfortunate! It requires qualification every time the phrase is used in front of non-computer people. The term should not be used outside of the programming environment, and professionals in the entertainment industry should make a special effort to maintain the distinction between true 3-D and 2-D with photographic perspective.)

Triple-I, of course, did the solar sailer, Sark's aircraft carrier and the MCP for TRON. Before that they did a simulated sculptural portrait of actress Susan Dey for LOOKER. They are highly regarded for their jug-

gling man, nicknamed Adam Power who is in their demo reel. An evil distortion of Adam's face, polygonal showing, was used for the face of the MCP in TRON. Art Durinski of triple-I remembers, "We made Adam three years ago, and since then he's been taking acting lessons. He does angles as well as the MCP! With our 'tweaked' program we do what are essentially key frames to get him to talk and change his expression. It took some time to design and digitize him but now he's in the system and you can use him for whatever you want."

It was recently announced that triple-I's motion picture division has joined forces with Gehring Aviation, a full service special effects company (they built the motion control system for STAR TREK-THE MOTION PICTURE) that has been doing vector style computer animation, in addition to live action and flying space ships and hamburgers (for McDonalds) with motion control. This union should make for a potent synergy.

CRANSTON/CSURI

In August of last year a new company opened its doors in Columbus, Ohio. It may be the newest outfit in the business, but its leader Charles Csuri, has been doing research in computer graphics for an incredible 17 years, and the work coming out of Cranston-Csuri Production shows it. The company's reel features a ball bouncing on a mirror surrounded by a crystal sphere, a plexiglass cube and a lens which materializes from a seemingly abstract pattern of giant pixels. It is a ray-tracing tour-de-force, with all the optical properties of the various materials correctly calculated. The company is doing work for medical research, architectural firms and commercial clients. Another memorable scene on the reel was of a skeleton that does a broad jump and then casually walks up to the "camera." This is the work of David Zeltzer. The naturalistic motion of the figure isn't done by key framing or digitizing an actor's motion; it is done with an algorithmic kinematic, a computer program based on the knowledge of how the human figure moves and how it is affected by gravity, inertia and so on. It is an extremely sophisticated procedure involving artificial intelligence (A.I.) It is safe to say that A.I. will play an increasingly important role in computer imaging during the years ahead. They expect to have the skeleton working in real time this win-

They already have him walking over uneven terrain, going upstairs and opening doors. They are working on a drunken stagger!

Cranston-Csuri is doing an interesting balancing act with respect to hardware vs software, relative to the computational cost of pictures. Their team of experts is exploring ways to have several micro-computers running parallel, distributing the job between themselves, "It's not a trivial problem," says Chuck, "one processor can tie up everything. But we think we can get a speed up of five or ten times over a Vax."

ROBERT ABEL

Robert Abel and Associates in Hollywood has been doing raster graphics R&D for a year and the results will be sure to inspire a new era of commercial graphics, if history is any indication. The digital elegance of Bill Kovacs's work with E&S vector animation has been awesome, and coupled with the talent of the Abel's art directors it has been THE benchmark for the field. Their raster system will "build on the shoulders of the vector system." That vector system, of course, was used for the dynamic "Flynn's Ride" and title sequence of TRON.

Building on its own shoulders is something that the computer graphics field is doing so fast that it makes one's head spin. With most of today's economy in the dumps, electronics is healthy, computers are booming, and computer graphics is a growth industry among growth industries. (Presently a \$4.6 billion industry, it is expected to hit \$15 billion by the end of the decade.) Unfortunately, only a tiny part of the computer graphics activity involves the entertainment industry. It's mostly going on in the automotive, aircraft and scientific fields. Yet, it is absolutely clear to a lot of people that computer imaging is going to make a splash in entertainment like the talkies did, like Technicolor did—like the Edison 35mm movie camera even! That's why people with an understanding of both business and the new technologies are supporting computer imaging.

George Lucas is one. "George came along and said he wanted to bring hi-tech to the industry," points out Ed Catmull. "This is an industry which has had very little technological change, practically none. It's an industry where even the companies that are capable of taking the risks

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are not inclined to do so. It's very pathetic. The movie business is so risky, they tend not to take any risks at all, whenever they can possibly avoid them." Lucas has plowed millions into education, including computers, where it will do good for the filmmaking community. Which, certainly pays back LucasFilm in the long run, but more than that, it succeeds in its intent to raise the overall standards of cinema.

TRON's Steven Lissbarger has no doubts that computer graphics will be an important factor in the near future. "People are going to have to come to grips with how they will utilize this, and then we'll be looking at whole environments where things are completely different from what we're used to seeing. I think we'll even see interactive movies with audience participation, eventually."

It's been figured out that if the automobile industry had paralleled the computer industry since World War II, today we could buy a car for \$2.75 which could get three million miles to the gallon! I guess the point is that we should take advantage of innovations that come along, and nourish them, instead of playing ostrich.

"We humans are going to be making pictures with computers from now on," says Alvy Ray Smith. "As a matter of fact it's going to become commonplace, just like the camera itself. The camera was an incredible development in its day, but now nobody gives a second thought to picking up a camera. And it's going to be the same with computer graphics, I suspect. First there will be a love affair and then everybody will settle down to making artistic use of the new language of images that are provided."

Personally, I look for the medium to go beyond an imitation of life, beyond fantasy, into universes of form previously unknown; the invisible beauty of mathematics and the dance of physics will become visible, we'll travel in rockets as they approach the speed of light—bending the fabric of the Heavens—and alter an actor's face to look exactly like Julius Caesar. And, I predict, it will bring new days of glory to the entertainment industry. ■

Peter Sørensen is a film and video director who has been using computer imagery for the past seven years. He is president of the Second Genesis Tool company, a computer graphics think tank in Los Angeles.

Panthers

Continued from page 68

desert sand and still give plenty of sock to the blue sky. We also use graduated opticolor and graduate neutral density filters extensively. They were wonderful for balancing "white" cloudy sky to a foreground of for allowing us to put a little extra exposure into dark green foliage. We could also get a wild effect by bringing a deep blue graduate down from the top for the sky and a coral up from the bottom for the desert. Even wilde was mixing magenta and coral together on time lapse sunsets and achieving an effect you just knew had to be shot on Mars.

THE PANTHERS

Co-ordinator Ron Oxley and trainers Steve Martin and Mark Weiner had just finished THE CAT PEOPLE and brought five "specialist" cats with them. Three cougars dyed black (cougars are easier to work than panthers) and two panthers were used. Each cat was a specialist at something. Of the cougars, Dylan was the friendliest one who could work around people the best. Since we had no people in the shots with the cats Dylan mainly slept. Jason, the fastest runner, made beautiful long runs in the desert and the snow. Shiloh was a tough cat that feared almost nothing. Once he ran right towards us and seemed to disappear from the frame right under the tripod legs. Scary! Of the panthers, Witchit was an incredible jumper and a very well trained panther, while Sasha was far too dangerous to ever be left off a chain but who made the most incredible close ups and snarls. Phil de Kanter, supervising director for Macho Films in Mexico and a veteran of previous panther commercials was an invaluable source of expertise and encouragement when confronted with the inevitable frustrations of working with five panthers in the wilderness.

VISUAL MUSIC

I previously described the effect we were going for as like poetry or as 'visual music'. This is because Michael Grunstein and his company (the Quicksilver Motion Picture Company) have developed a method of composing images onto multiple visual tracks, previsualized by running simultaneously on computer interfaced KEM editing machines. When Michael has sensed how the shots will dissolve, superimpose and matte

SIGGRAPH'83 SIGGRAPH'83

Call for Participation Art, Film and Video

ART SHOW

Computer-generated drawings, photographs, sculpture, prints and murals are being reviewed for inclusion in the July 25-29

SIGGRAPH '83 art show. Also being solicited for the art show are film and video works and installations involving computer graphics.

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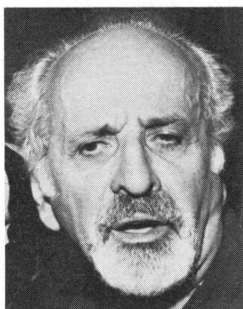
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SIGGRAPH'83 SIGGRAPH'83

ELITE FILMS DIRECTOR BEN SOMOROFF FINDS LTM MSL 250 ...CLOSE TO PERFECT" FOR DEMANDING MACRO-CINEMATOGRAPHY



Director Ben Somoroff is generally credited as the originator of the term, "tabletop photography." For more than forty years, he also has been known as the foremost innovator and acknowledged master of the tools and techniques of extreme-closeup photography.*

Somoroff characteristically was one of the first to utilize the unique capabilities of LTM's fibre-optics MSL 250 System.

An example is his use of the MSL 250 in the filming of current TV commercials for Seiko Watches and Olympus Cameras. Delicate and precise lighting was essential for full-screen images of individual features as small as 1/8 inch or less; and, because of the placement and configuration of other product elements surrounding the tiny subjects, it would have been, if not impossible, at least enormously time-consuming and costly to light them by any other means.

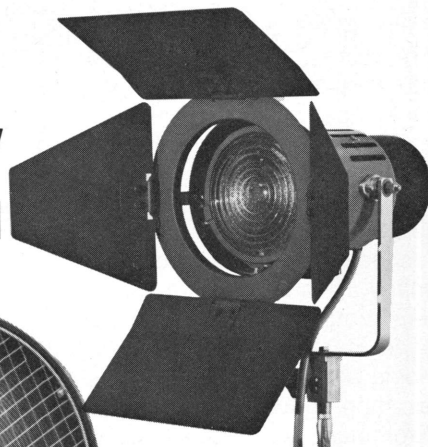
In the Seiko filming, for instance, one shot called for an extreme, edge-to-edge closeup of a very small digital display that was recessed into the analog face of the wristwatch, with a smooth, unbroken pullback to reveal the entire watch face. The in-position of the camera lens was no more than 1 1/2 inches from the subject, and the inset digital display was of the liquid crystal type. So the problem was not only to illuminate the bottom of the recessed area; it was also to prevent any flare or blurring of the numerals under the reflective surface of the liquid crystal display. Somoroff positioned just one flexible cable of the four-cable MSL 250 at the edge of the camera lens. It provided precisely the quality of illumination required to bring up the tiny, recessed display to fill the screen edge-to-edge with the clean, sharply-defined numerals Somoroff wanted.

Elite Films producer Alan Sadler agrees with Ben Somoroff's opinion that LTM's MSL 250 systems are "...close to perfect" for their work. Sadler notes that all of their lighting is kept precisely at 3200 Kelvin, so they routinely use temperature-compensating filter "snoots" of Sadler's own design, slipped onto the ends of individual cables as they are used, to reduce the MSL's 5600 Kelvin daylight color temperature to their 3200 Kelvin standard. He says, "We use the MSL 250 System selectively, of course, but often. Often enough, in fact, that I'm impatient for the time to arrive when I can buy our own units from LTM."

**While Ben Somoroff is best known since the advent of television as a highly skilled and innovative filmmaker, he is equally famous as a still photographer, with examples of his masterful works hung in the Permanent Collection of the Museum of Modern Art in New York.*

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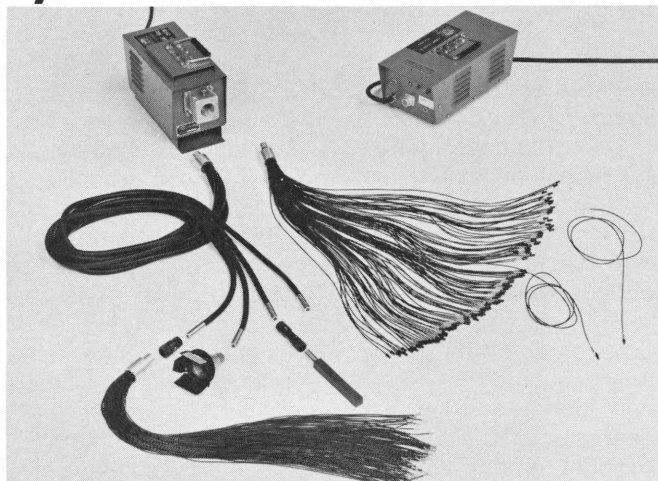


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together (there were no cuts in the commercials), he transfers the selected portions of the negative onto multiple tape rolls with the Rank flying spot scanner and orders the various holdback mattes and 'electronic opticals' that are needed. Using a 'score' generated by his computer, he then mixes the rolls in a video edit bay with as many as three operators handling faders simultaneously to create a finished master tape of images that combine and flow together more like music than conventional cutting. The extraordinary visual quality achieved would not have been possible without the superb staff and facilities at Complete Post Production Center and at Pacific Video. Nor could it have been achieved without the mastery of Russ Srole, our video liaison and of Ian Yarborough at AME who most sensitively transferred our film onto videotape.

MATTES

The elements we had to photograph for matting were panthers, people and product. All of these were shot against standard blue screen and against black. But we also needed very wide slow motion running shots of panthers for matting.

This could create a massive lighting problem. The first thing we decided was to go for a 'density' matte rather than a blue screen matte on these wide shots. This meant perfectly even lighting of a white set so the mattes could be pulled from the density difference between the black panther and the white background. The trickiest thing was to get sufficient light *under* the panther to wash out the shadows he makes on the white floor. We used the fast 5293 stock and after testing, our optical lab's densitometer suggested we rate the film at ASA 640 for optimum contrast. Even at that it took 20 6K chencoops, 20 5K sky pans and 10 big eye 10Ks. That's a third of a million watts of light! We figured it would have taken around a million watts to have done blue screen and at least two million to have done slow motion wide shots of running panthers, blue screen on 5247 stock!

Big cats in their natural habitat tend to hunt at night while its cool, and sleep during the warm day. It was extremely important for Gaffer Doug Mathias and his crew to have the whole lighting rig dimmable and switchable to reduce heat.

THE IMAGES

Envisioning the way the film would be 'mixed,' we made some unusual kinds of shots. We shot full bleed plates of abstract water reflection leaves blowing in the wind, kinetic rushing water, time lapse boiling clouds. We made a 1000mm lens shot of the full moon moving through clouds. We helicoptered to the spectacular view from the top of Hunt Mesa in Monument Valley to do a time lapse sunset and a product shot of a brandy snifter with all of Monument Valley seen through the glass.

Our location crew consisted of grips Ken Wheeland and Roger Olkowski, camera assistants Mike Little, Larry Dyer and Rick Mention, production coordinators Rita Xanthoudakis and Benette Rottman, Scott Ransom who got us some fine long lens and skiing shots in Telluride, director Michael Grunstein, production manager Mark Kitchell, Phil de Kante and Angel Fernandez from Machete Films S.A., and Hector Romero representing the client. It was a great experience to go to some of the most beautiful places on earth with a fine crew and a spirit of adventure.

Spielberg & E.T.

Continued from page 49

challenge. We would see him in silhouette, we would always view him in backlight, but you would never get a good look at his face until much later in the movie. It took many, many small, small units of light and many pieces of aluminum foil to use as bounce cards. We were really able to mold light with E. T., but you couldn't do it in the master shots or the lights would show. And E. T. was really limited in movement when Allen had to make him more mysterious. It took a lot more time to light E. T. than it did to light any of the human beings in the movie, and I think Allen spent his best days and his most talented hours in giving E. T. more expressions than perhaps Carlo Rambaldi and I had envisioned, because he found by moving a light, by moving the source of the key from half-light to top-light, E. T.'s 40 expressions were suddenly 80. E. T. could not only look sad but he could look *curiously* sad. Not by the way we controlled E. T. mechanically but by the way Allen shifted light."

Another necessary aspect of the film was to keep the viewpoint that of a child. This meant, Spielberg re-

called, "that the camera was always on the Fisher dolly and the lens was usually around four feet, eight inches in the air. There are a lot of ceilings in the movie because so often a child's point of view does look up, especially Elliott's point of view of his older brother. I'd always drop the camera a little lower because that was Henry Thomas's point of view, and E. T.'s point of view was even lower than that, two feet, nine inches off the ground. For this and other reasons I chose not to show faces of adults except for Mary, the mother, because I didn't really consider her an adult, I thought of her as one of the kids in that household. She was just like anybody else who could keep a secret. But I avoided showing the biology teacher, avoided showing any of the policemen or any adult strangers until the very end of the movie, when you finally were confronted with all the doctors and scientists.

"Very early in our relationship we discussed concepts of lighting style. I wanted the movie to look very realistic, meaning that if it's 10 o'clock in the morning the sun's going to come directly through both windows and blinds of Elliott's bedroom and they're

going to be very hot in contrast to the rest of the room, which would be dark to the taste of the kids—Elliott's taste as a little boy growing up in suburbia, with all the trappings of suburbia, such as the dark posters on the wall and the electronics on the work table. So we went for a very extreme key to fill ratio in lighting most of the scenes at the beginning of the picture, but we reserved the close-up where E. T. makes his home as a kind of magical wonderland. We took great pains to stylize all the shots inside the closet; for instance, it was Allen's idea to put a yellow neckerchief over the lamp in the closet to bask everyone in a kind of whimsical sunset. I wanted a stained glass window in the closet to be able to justify spattered colored lights. This continued the magic of E. T. in the only place he's going to be able to call home for the next couple of weeks, so we decided to really let the closet be the magical hideaway but let every other room in the house be brutally dramatic and not suggest that we were making a picture about contemporary fantasy but, in fact, we were making a movie about contemporary suburbia and the visual reality suburbia seems to

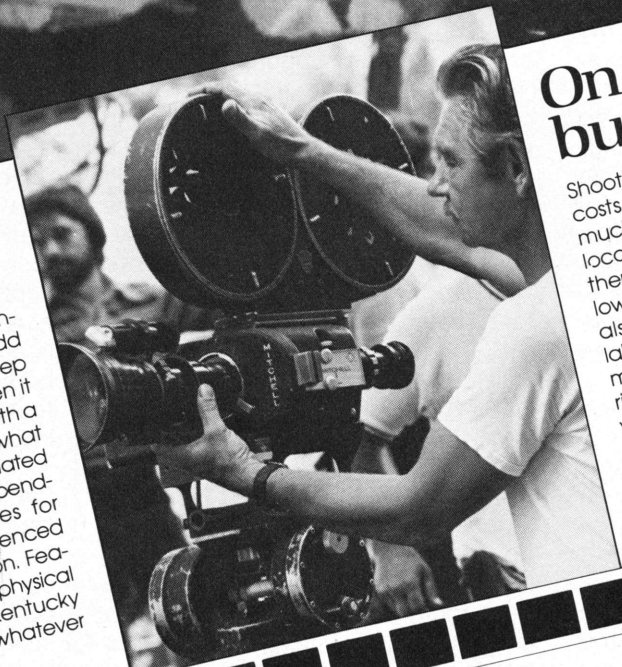
"Kentucky's beautiful behind the scenes."

Phyllis George Brown
Chairperson, Kentucky Film Development Foundation



On location...

20th Century Fox Television's "Kentucky Woman," starring Cheryl Ladd and Ned Beatty, was filmed deep in Kentucky's coal country. When it came to matching the script with a location, the filmmaker found what he wanted in Kentucky—an isolated coal mining region offering dependable transportation services for dailies, and personnel experienced in motion picture production. Featuring an incredible range of physical beauty and character, Kentucky sets the stage easily for whatever the script demands.



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invite. But the closet was magic, and then we decided conceptually that once the scientists and doctors occupied the house and the front and back yards we would go for a rather antiseptic white on white AMA look.

"A lot of that was due to a fantastic production designer, Jim Bissell, who really helped our concept in somewhat 'painting' everybody white on white, from Deborah Scott's environmental protection suits, which were white or a very pale blue—what we called the clean room suits—to the scientific hardware which Bissell assembled and the actual clean room environment with the see-through, clear plastic shower curtains and the clear plastic that was embroidering the entire living room, dining room and kitchen, which had been turned into a field hospital from an ordinary Hot Point kitchen. You could almost smell the antiseptic.

"He lit everything where you can see the lights. The lights that helped to light the antiseptic clean rooms are actually in the picture—they're clip-ons on top of the clean room area. Allen was very conscious of what kind of day it was and he kept pressing me to give him the *exact* time of day when each moment took place inside the clean room, because that would certainly affect what kind of light seeps through the windows which are covered over by many layers of clear plastic. That had a dramatic effect, like in the scene where E. T. dies and Elliott says goodbye to him, that is a very early morning; there's almost a pale red coming from the two windows behind Henry Thomas as he bids his final farewell to E. T. As the day progresses the reds were removed and the windows became warmer and then suddenly they became suddenly hotter as you lead into a late afternoon chase.

"We don't really pay very much attention to how long it takes Elliott to evacuate E. T. from the clean room and into the Econoline van. But we do abbreviate our day, because by the time we're on the road and escaping the police it's late afternoon with dusk rapidly approaching. We take some time license with that part of the movie, but it was very important, I thought, to suggest a pinkish color to the goodbye scene with E. T. Allen was very, very aware of time and even how time moved. The look of Elliott's bedroom when the mother puts him to bed when he's feigning illness and sticks a thermometer in his

mouth, that's before school starts, about 8:30 in the morning, so the sun is very strong through all the layers and hitting everybody. By the time school's over and Elliott's brother Michael comes home and Elliott shows Michael E. T. for the first time, the entire source of the sun has shifted and it's no longer coming from the windows over Elliott's bed, it's coming from the windows by the work bench, so the sun has gone across the sky. Allen was very time-conscious about the source of the sunlight.

"There aren't many pictures that all take place in a child's bedroom closet, and I'm used to painting on a large tapestry. Condensing the story to human people and to extra-terrestrial people and to a closet environment suddenly got me thinking we don't have a thousand extras to paint my canvas with but we do have light, we do have the sun, and we do have a kind of color texture to work with, let's let the lighting give the movie the production value. So in this movie, more than most of my films in the past, lighting really supplies a lot of value. Lighting puts money on the screen more than background extras or numbers of cars. I think as a director I was more conscious of lighting on E. T. than I have been on any other movie before. Especially where E. T. was concerned, because the lighting on E. T. was very important.

"You saw only the back of the principal's head and his shoulders and hands, but you never saw his face. It has Harrison Ford and he consented to do a day for me, but that scene never made it into the final movie. So I owe Harrison about seven more closeups on the next Indiana Jones feature, which starts in April."

E. T. is more of a personal film for Spielberg than is RAIDERS OF THE LOST ARK, which he directed for producer George Lucas. "RAIDERS, for me, is more George Lucas's dream that I realized because George stopped making movies, at least temporarily. It's something I wouldn't have come up with—I never would have thought to make a feature version of a Republic serial, you have to leave it to George Lucas to think of something like that. I'll always consider RAIDERS to be my film as a director but George's film as a creator. The one thing we always have in common is that we just love audience movies, slightly taller than life.

Other Spielberg films have been ex-

tensively storyboarded before principal photography was undertaken. E. T. is the one exception.

"I decided that storyboards might smother the spontaneous reaction that young children might have to the sequence," Spielberg explains. "So I purposely didn't do any storyboards and just came onto the set and winged it every day and made the movie as close to my own sensibilities and instincts as I possibly could."

This did not apply to the special effects scenes which were done under Dennis Muren's supervision at Industrial Light and Magic in Marin County, Calif. In this specialized area storyboards are essential, according to Spielberg.

"I did storyboard about 45 special effects shots because I.L.M. is paid by the shot and it's very important that you are specific right down to where the light is coming from and right down to the exact frame count for the shot. You can wait for the muse to strike on a sound stage, you're responsible for the ultimate schedule, but where I.L.M. or any special effects shop is concerned every shot costs X amount of dollars. Often they'll give you a handle on each side of the usable portion of the shot, but even the handles start to cost money. Because Kathy Kennedy and myself were trying very hard to make this picture for under \$11,000,000—and, of course, we succeeded in that."

"Dennis Muren is an artist as well as a technician, and he has a way of flavoring each shot so that it gives you more than originally imagined. Dennis would always add so much more to each concept to make the shots really come to life. You know a concept is only a battle plan, but there is an individual effort given by everybody who works in the special effects. They're dedicated, and they love shows.

"We kept striving for a reality. The fantasy was a concept, but the reality was what sold it. The concept of flying bicycles is a fantasy right out of our eight-year-old dreams, but the concept of how real the sun should look and how much would it flare through the lens—that's the reality that sold the shots."

The Spielberg approach differs substantially from the way most fantasy films have been done in the past. The producers of THE WIZARD OF OZ, THE BLUEBIRD and PETER PAN deliberately recreated an atmosphere

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reminiscent of the great fairytale illustrations of Rackham and Doré, Spielberg wanted nothing of New Neverland in E. T.

"I mean, mid-day clouds are white, not purple. I just think if you're going to have to go find some clouds that clouds should be white. It's very important with E. T. that everybody who saw the movie believes that E.T. could come into their back yards and walk into their homes to visit their children. You really can't do that if you set the stage for storybook unreal. I think you have to get just the opposite. I work very hard to juxtapose a kind of contemporary suburban or urban truth on fantasy images."

Spielberg emphasized the importance of editing in creating the realistic fantasy he wanted.

"I worked with a new film editor, a woman named Carol Littleton, who made countless fantastic contributions in post production to the assembly of E. T. She's one of the few editors I know who cuts to music, and she selected some fantastic music for our temp tracks to cut to. She found some Shostakovich, which she cut the first movement of the film (the chase in the forest), and Howard Hanson's Romantic Symphony which we paced the final 'good bye' scene to, and even some of the sound tracks from Hal Ashby's film BEING THERE—some of that wonderful music by Johnny Mandel. We were very successful in putting some of our images to music and then taking the music out so Johnny Williams could have a fair shot at imagining his own themes. Carol is a wonderful film editor, and she works long, hard hours. She is a genius at rhythm, at a frame off and adding a frame here or a frame there. She's just one of the best experiences I've had in the editing room. I feel very, very honored to now have worked with three of the best film editors in the business: Verna Field, Michael Kahn and Carol Littleton.

"Also, this was a triumph for new faces. We had so many first-timers on E. T. We had a majority of women working key positions on the crew and in administrating, from Melissa Mathison, who wrote the script, to Kathy Kennedy, who co-produced with me, to Katy Emde, who was the first assistant director, to Deborah Scott, who did the costumes—there were so many women in position often, in the past, filled by men. It felt very womb-like going to the set ever

"It was, un-technically, Allen Ivau's first feature—he had made film in Canada—but it was his first theatrical feature film. It was Jim Sells's first theatrical feature as a production designer and art director. It was Kathy Kennedy's first feature as a producer and Melissa's first feature as an associate producer."

One thing that amazes Spielberg is that so many patrons return to see certain of his productions over and over again. "It's kind of like playing video games. A kid plays a video game and he receives a perk for his starter, so he puts another quarter in for another perk, and of course it's a series of diminishing perks because once he conquers the idea and once he overcomes the challenge of the game, he goes on to other games. I hate to compare movies to video games; in a way with repeat business as a fair comparison, it's one of the few comparisons around. People go to a movie to be entertained, but they also would love to have some measure of control over the experience. It is a phenomenon to me why these people see movies more than twice. I get letters from people who have seen RAIDERS 20 times and seen E.T. 30 or 40 times and I don't answer their mail because I'm not a qualified drink."

On the other hand, Spielberg admits he likes to see certain favorite scenes again. "I look forward to seeing the fragmented moments, like THE AFRICAN QUEEN I always liked the sequence with the leeches and I like the sequence where they hit the falls for the first time and have to maneuver their way out. It doesn't have to be the whole movie you yearn to reexperience, it can just be precious, highly prized antiquities left over from a film in your memory."

Spielberg sometimes likes to include a homage to some favorite old movie scene in his pictures. One such gesture honored stuntman Yakima Canutt's famous fall under the racing stagecoach in John Ford's 1938 STAGECOACH. "We did a version of that stunt in RAIDERS OF THE LOST ARK when Terry Leonard, doubling for Harrison Ford, falls off the bumper and grabs the universal joint of the truck and goes hand over hand all the way down to the tail bumper, where he uses his whip to climb back on. That was a Western homage, a variation on a Canutt theme."

Cinematography for E.T.

Continued from page 58

ceived his IATSE designation. "It was the Gobi Desert sequence for the new edition of CLOSE ENCOUNTERS OF THE THIRD KIND. Steven had seen THE BOY WHO DRANK TOO MUCH and called me. "When anybody asks what it's like working with Steven, I answer in two words, 'never dull.' He pushes you beyond what you thought you could do and brings out the best in you. He makes you look and think and never stop searching for something new. You will never get complacent on a Spielberg film."

"One time he told me, 'Allen, if you blow a scene because you went too far, I won't be half as mad at you as I would be if you blew it because you played it too safe.' For instance, one time he asked, 'How would it look if we overexposed somebody's face five stops?' I wasn't sure, but I gave it a try and held my breath throughout. It was when the boys were searching the garage for objects to build the communicator. The extreme contrast made a dramatic effect and the scene is in the picture."

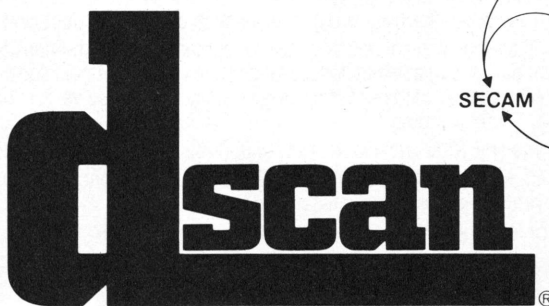
"Steven will say two things that may appear contradictory. That

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means he wants you to work toward incorporating both. For example, he wanted E.T.'s skin to glisten, but wanted him to stay indistinct. Another time he said, 'I don't want to see his face, but I want to see *just enough*.' Challenges like that make for distinctive photography. For that scene in the bedroom where Elliott entices E.T. out of the closet, I had to make E.T. as near a silhouette as possible and still show his eyes!

"We first talked about E.T. in February of '81. It was originally to start in May but it was postponed many

times. Steven was finishing ADR on RAIDERS OF THE LOST ARK at Goldwyn Studio and I sat outside, reading the script. He said that if you're going to do a modern fantasy in suburbia it has to have a basis in reality.

"It didn't start shooting until September. One big advantage on this picture was to be on the job when the production designer, Jim Bissell, was planning the sets. Usually, the cinematographer is the last man hired and has to make do with whatever is handed him. This was the first time I

was able to talk with the designer about (for example) where the windows would go.

"We sat down with Steven and started screening movies together. This is the best way I know to start, watching our own movies and other people's movies, discussing them, evolving the style we want. We watched NIGHT OF THE HUNTER, ALIEN, APOCALYPSE NOW, LAST TANGO IN PARIS—I got what all.

"Originally it was to be storyboarded in detail, like all of his other pictures, but suddenly there wasn't enough time. So, only the special effects sequences were storyboarded. Otherwise, we were winging it. The house was as real as we could make it. The original house that was selected was in Northridge (California) but we wanted one that was backed up closer to the mountains. It was found at Tujunga (Calif.). We had to make it cut together with the neighborhood at Northridge.

"I told Jim that as much of the story takes place in the closet in Elliott's room that it must have a window, otherwise how would the audience be able to tell day from night? And I figured out how to do it without seeming strange that there should be a window—a stained glass window!—in a closet. It's just another example of how a first-rate production designer makes a cinematographer's work more rewarding."

Daviau also believes that much of the photographic success of E.T. was due to a first class lighting and camera crew.

"I first met my gaffer, Jim Plannett, and my key grip, Gene Kearney, on the set of CANNERY ROW at MGM. Jim introduced me to one of my heroes, Sven Nygvist and I found myself unable to tell him how much his work has meant to me. The size of the set he was photographing was awesome and I was very impressed with the way Jim and Gene had rigged it to allow easy transitions from one time of day to another. This flexibility was carried over to E.T. With our schedule day and night had to interchange with a minimum of delay, and with the help of their expert pre-planning and extensive improvisational abilities we were able to change time and mood almost as quickly as we changed our minds.

"One thing we borrowed from Sven was the use of muslin ceilings in the interior rooms. We were able to re-

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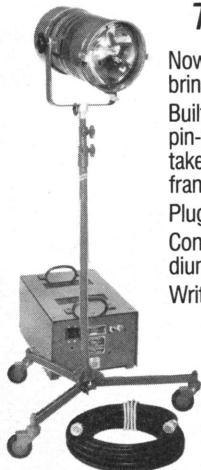
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ht from above that, when diffused
the muslin, added just the smallest
uch of ambience to the day scenes
thout the look of 'fill' light."

Interiors were staged at Laird Inter-
national Studio in Culver City, which
as a venerable history. Built origi-
ally in 1917 by producer Thomas H.
ce, it later became the Pathe Stu-
o, Pathe-DeMille, and RKO Pathe.
uch notable independent producers
s Edward Small, Sol Lesser and
avid O. Selznick produced their
est-known films there.

"I enjoyed working on the lot where
ING KONG and GONE WITH THE
IND were filmed," Daviau says. "In
y mind there is a *presence* to a stu-
o where great pictures have been
ade. I would at times have traded a
small amount of that *presence* for a
w more feet of grid height for the
ght back yard set on Stage 3,
ough. Poor John Fleckenstein, my
operator, always had to *just miss* the
w-hanging 10Ks above the garden.
nd on the widest of the wide shots
e are seeing every inch of set that
m Bissell had been able to fit in
ere. But, as they say, limitations can
ecome strengths if you go with the
ow. One of the perverse joys of cin-

ematography is knowing that just out-
side of a perfectly framed scene lies
total chaos.

"We used a lot of mist every day on
that stage, which became known as
'misty valley.' Working with smoke
and fog is an interesting experience.
We were shooting in late summer

*"Nobody who knew
Steven back in '67 is the
least surprised at his
success."*

without refrigeration, and everything
was okay in the morning while it was
cool, but as the day went on all the
fog would roll toward the west wall,
where the heat of the sun attracted it.
We had to try to finish shooting before
the fog started drifting.

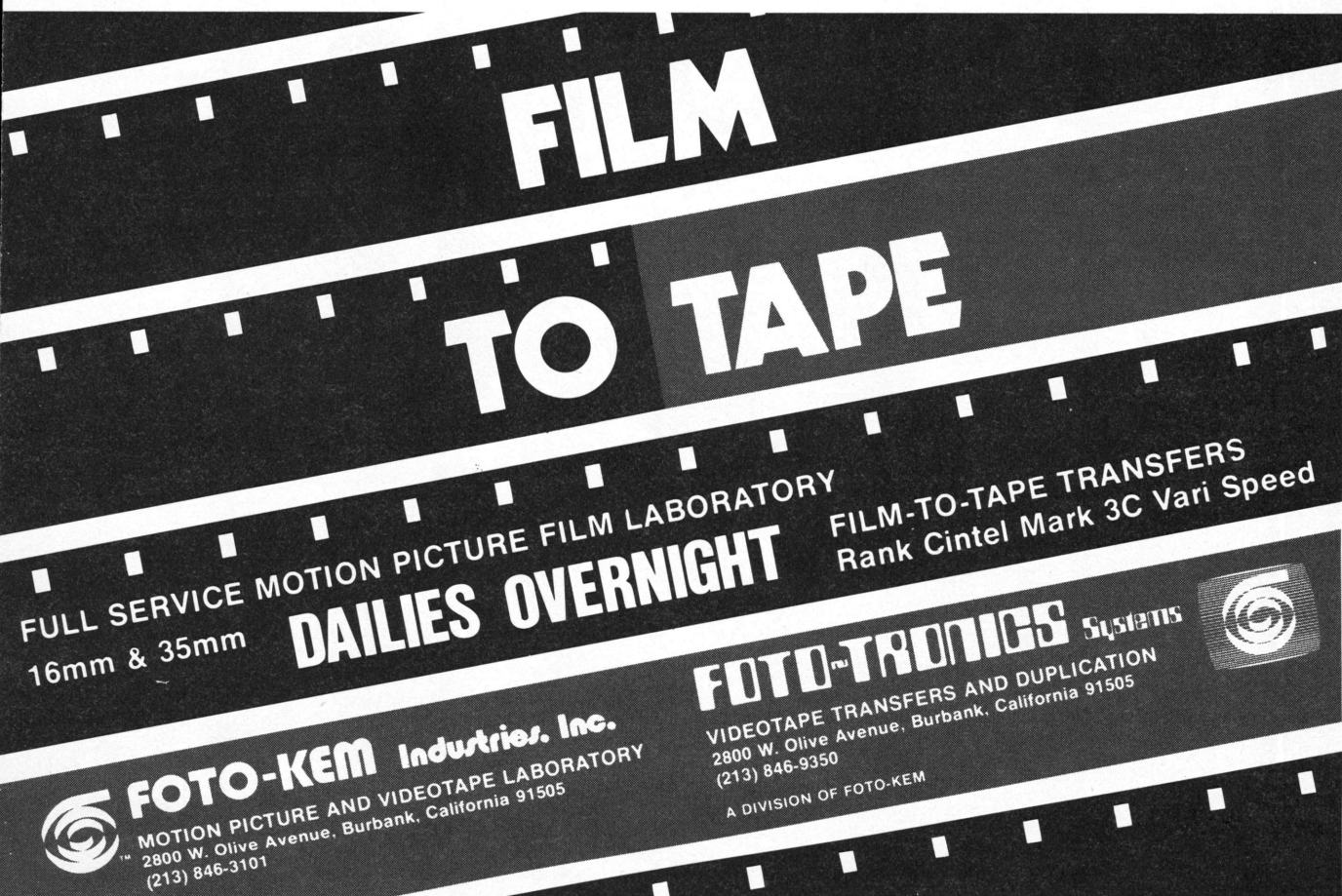
"It's very tricky, especially in big
exteriors, to judge exposures in
smoke or fog. I had to literally 'light
air.' We had a few days of testing so
we could play with the fog on stage. I
found that averaging exposures using

a spot meter was the best way. We
did tests with a meter on a tripod and
found there were no set methods or
simple guides to exposure where you
have to view elements in both the
foreground and background. My ad-
vice is don't try to jump around in the
printing light trying to get exposures.

"It's magic stuff. In the forest
scenes, sometimes the trees are only
20 feet away and the smoke gives the
illusion of depth. Just look at the old
Universal Sherlock Holmes myste-
ries; they were made on low budgets
but they had real atmosphere and an
effect of scope. They used 'fog' the
way we did.

"I try never to become prejudiced in
favor of only one kind of lighting. I al-
ways like to explore different ways of
lighting. In this I got to use just about
every technique of lighting I ever
learned—hard-edged, old fashioned,
visible source, tiny lights. We wanted
the color clean, unfiltered, with good
solid blacks.

"We used spherical format, with a
1:85 frame and 1:66 hard matte. We
were working with a low light grid a
lot, seldom no more wide open than
2.5, although we used the fast lenses.
We used Eastman 5247 throughout,



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with no pushing, no flashing—just the normal processing for natural, healthy negatives. We decided the texture should be sharp and clean with rich blacks.

In the house interiors, Daviau used both soft light from practical lamps included in the decor and hard light as well.

"The set decorator, Jackie Carr, and her assistant, Sandra Renfro, brought in dozens of lamps and we auditioned lamps to choose the ones we wanted. We had to get fantasy colors and yet make them seem to come from natural sources.

"It was difficult figuring ways to keep E.T. himself in a consistent aura of backlighting. One of the things that makes E.T. work as something other than a mechanical thing is having backlight behind him at all times with a lower light level in front so there is little detail in the face but with a catchlight in those wonderfully expressive eyes."

One scene which helped to establish this style was, to the cinematographer's sorrow, cut from the release version.

"It's near the first, when Elliott's mother calls him upstairs. There's an

overhead light on, for the only time in the entire picture. As Elliott listens to the lecture, he turns off the overhead light, reducing his mother to a silhouette, and then he goes around turning on all the little lights he had placed around the room, relighting the place to his satisfaction. It was cut, dammit—but it was wonderful in that it established where all the lights came from that were used for all the scenes that followed in that room."

When the field hospital was set up at the house the lighting effects were hard and the warm, homey atmosphere was gone. Yet the photographic technique remained consistent with the earlier scenes.

"The field hospital sequence is a classic case of being able to have the light sources in the picture. Most of the lighting comes from real medical equipment. Steven likes the motif of lights shining right into the lenses—remember CLOSE ENCOUNTERS?—and we gave him plenty of that. We had great freedom to move around. My men, John Fleckenstein and Steven Shaw, were kept busy chasing people through those plastic tubes with the camera.

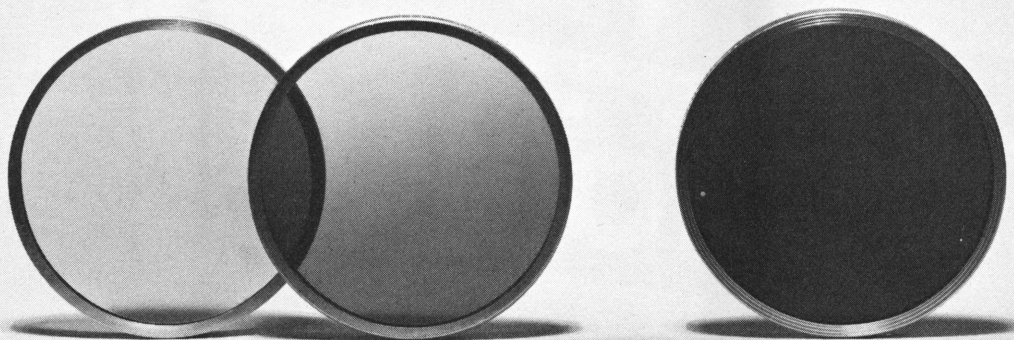
"The forest scenes are some of the

toughest work in the film. You'd amazed at how much cable it took us to be able to move around the forest at night. We had to be able to move the lights, find the boxes and not break our necks."

Daviau doesn't feel that a cinematographer's job is done until the release prints are ready. "If a cinematographer is interested in what goes into the theaters he must follow the film through the lab. If it's for TV he should oversee the electronic transfers. Whether they like it or not, cinematographers had better get ready for electronic presentation of their work.

"For E.T., Deluxe did the first stage work and Technicolor made the release prints. We had no dupes of ourselves, it was all A and B work. The only dupes are in the actual optical effects work, as we wanted first generation film whenever possible. The dailies were on 81 print stock, and the time we got to the release prints we used 83 print stock. Steven said to keep it saturated, keep it strong and they did. Deadlines were fierce on E.T., but we had good rapport with both Deluxe and Technicolor. We were at Technicolor for 10 weeks, and the

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for timer, Bob Raring, really locked himself out for us."

The consistency of photographic style is one of the remarkable things about E.T. Daviau says that much of the credit goes to the film editor, Carol Littleton, "who did a terrific job of keeping the style together."

Every cinematographer has a favorite scene in each picture he works on, one that captures best what he wants to put on the screen. "If I had to choose a favorite," Daviau says, "it would be the one in which the youngster says, 'I'm keeping him.' The little girl walks forward, there are highlights in E.T.'s eyes, no detail in the face, and the light is yellow. The effect is very much that of a Maxfield Parrish painting."

THE CREDITS

Produced by STEVEN SPIELBERG & KATHLEEN KENNEDY
 Directed by STEVEN SPIELBERG
 Written by MELISSA MATHISON
 Director of Photography ALLEN DAVIAU
 Production Designer JAMES D. BISSELL
 Edited by CAROL LITTLETON
 Music by JOHN WILLIAMS
 Production Supervisor FRANK MARSHALL
 Associate Producer MELISSA MATHISON
 Production Manager WALLACE WORSLEY
 Assistant Director KATY EMDE
 Second Assistant Director DANIEL ATTIAS
 Created by CARLO RAMBALDI
 Visual Effects Supervisor DENNIS MUREN
 Costuming Designer MIKE FENTON & JANE FEINBERG
 Hair Stylist MARCI LIROFF
 Makeup Artist JACKIE CARR
 Second Unit Director GLENN RANDALL
 Production Trainee JOHN FLYNN

Production Coordinator SUE DWIGGINS
 Script Supervisor ESTHER VIVANTE
 Location Services DICK VANE
 Assistant to Mr. Spielberg JANICE POBER
 Assistant to Ms. Kennedy DENISE DURHAM
 Assistant to Mr. Marshall PATTY RUMPH
 Production Associates MICHAEL BURMEISTER
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 Second Assistant Cameraman RICHARD FEE
 Still Photographer BRUCE MCBROOM
 Sound Mixer GENE CANTAMESSA
 Boom Man RAUL BRUCE
 Sound Technician CHARLES PAYNE
 Gaffer JAMES PLANNETTE
 Lighting Best Boy JOSEPH CAPSHAW
 Key Grip GENE KEARNEY
 Grip Best Boy BOB MUNOZ
 Dolly Grip DONALD HARTLEY
 Construction Coordinator ERNEST DEPEW
 Set Designer WILLIAM TEEGARDEN
 Production Illustrator ED VERREAUX
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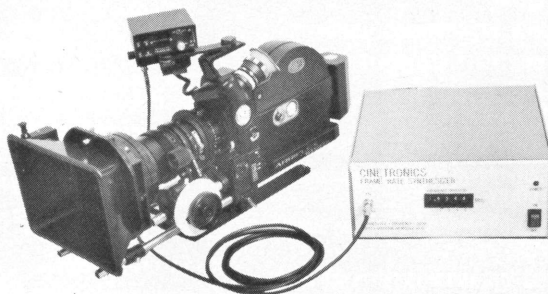
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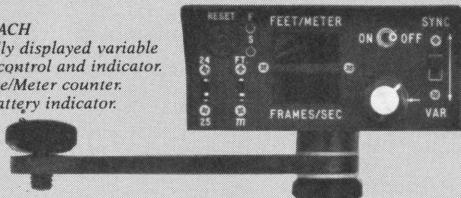
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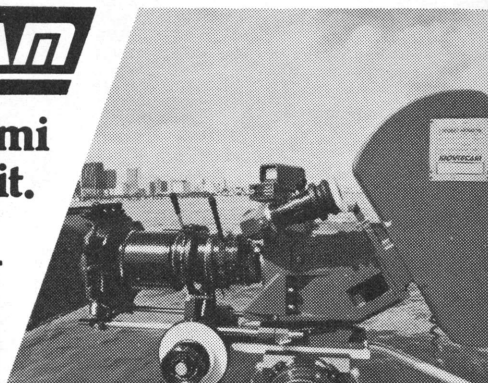
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American Hero

Continued from page 44

a new script required a shot of Katt flying in a specific situation—holding something, for instance, or reacting to a certain background—the first unit grip truck carried a 12-by-12 foot blue screen and frame that could be set up on locations. They could only shoot Katt from the chest up as he lay on a board, but for short inserts it worked and it solved the problem of springing Katt from the set and saved the expense of going to the blue stage.

Another system that Nelson devised to try to improve Katt's flying technique was not so successful. Nelson set up a small blue screen out in a large parking lot and hung Katt down on wires in front of it. A camera on a Continental mount was placed on an insert car and driven towards or away from Katt, which Nelson hoped would create the illusion of flight over longer distance to or from the camera. (The camera's view did not have to be completely filled with the blue backing since a "window control" on the Ultimatte compositing unit can fill out the blue backing artificially if the foreground object is at least surrounded by blue.) But many problems—including bumps in the parking lot, difficulty keeping Katt in front of the screen and finally lack of time to try the experiment again—forced Nelson to give up the experiment.

By and large, the system that evolved to get the Greatest American Hero into the air for a pilot and 29 regular-season shows was a remarkable achievement of improvisation and compromise. As Nelson said, the results were acceptable and given the pressure of getting the shows on the air, there just wasn't time to try anything else.

And for the price it could not be beat. Ruxton's Ultimatte system rents for about \$800 an hour. Bill Hogan at Ruxton said there was one 14-hour day when they turned out 112 different composited pieces at about (calculating quickly) \$100 per shot (on 2-inch tape, which still had to be transferred to film negative by Image Transform). That's compared again to the estimated \$2,500 per shot for blue-screen film shots composited on an optical printer.

Hogan also recalled occasions when new background plates would be shot on a Tuesday, for instance. He would have the developed film transferred to 1-inch video tape on

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Wednesday, combine the background on the Ultimatte with an appropriate foreground clip of Katt, take the composite on 2-inch tape to Image Transform on Wednesday night and get film negative back by Friday, in time to cut it into the show which would be delivered to ABC by Monday for airing on Wednesday. That meant it took less than a week to go from raw elements to national television.

But about the time production of the first 29 shows was winding up in early 1982, Nelson heard that the Zoptic front projection system they had solved the flying problem on *Star Trek: The Motion Picture* and *Star Trek II: The Wrath of Khan* was being wooed by Hollywood by Paramount. Nelson contacted the designer, Zoran Perisic, and began negotiating, despite his fear that it would be too expensive.

The Zoptic system was perfect for the needs of "Hero," if Cannell could afford \$10,000 a day basic rental fee. It was designed just for flying, and as a front projection system it took care of the compositing in the process of filming the foreground, a step that had to be taken anyway with blue screen.

Perisic's design works by creating motion in depth with zoom lenses and camera rolls, pans and tilts, while the foreground subject remains still. As with a normal front-projected compositing system, a projector puts the background scene up on a screen of highly reflective material. By using a two-way mirror, the axis of the camera is the same as the axis of the projector so the foreground object exactly masks its own shadow on the screen in the view of the camera.

Perisic's contribution to front projection special effects, which he has patented, is a pair of zoom lenses, one on the projector and one on the camera, synchronized electronically to zoom in and out in unison. When the zoom lens on the projector is projecting a large image of the background plate on the screen, the camera's zoom lens is viewing a wide image, too. As the projection lens zooms in either direction, so does the camera lens, and the background does not appear to change size inside the camera. But the camera zoom does bring the foreground subject closer or farther away, creating the illusion of motion in depth against what appears to be a fixed background. By zooming in towards the subject, it can be made to appear to fly towards the camera and then over the top of it.

Perisic has also developed an elaborate

ate mounting system for the cam-
a so it can pan, tilt and even roll over
0 degrees. Through camera moves
one, he can film a scene in which a
er appears to enter the frame from
e left, does a complete loop and
en flies out of the frame to the right.
the while, the flyer is mounted in a
dy mold on the end of a steel pole
uck through the front projection
reen. He can be evenly lit and rest
omfortably, free from fear of swing-
g into the rafters.

Moreover, the composited scene
n be viewed on monitors as it is
ing set up so that lighting can be
atched to the background. If the
er is to move through a shadow, key
hts can be dropped out to match
s.

In April of 1982 Perisic set up his
stem on the Paramount lot. Cannell
roductions found they could afford
e rental since the costs of image
ansferring and electronic composi-
g would be gone. All the composi-
g would be done in the shoot on
erisic's stage. Still, Nelson con-
ssed that their overall costs were
ightly higher with the Zoptic system,
ut he felt that the results warranted

The production schedule on the fly-
g effects, for shows that began Oc-
ber 29, was much more straight-
rward. They still shot background
ates from a helicopter, employing
eteran pilot Jim Gavin, filmed slightly
lower than normal to increase the
eeling of speed in the air. For the new
eason, Gavin flew some spectacular
enes, down the Los Angeles river
nd under a series of low bridges, and
traight at the Hollywood sign in an-
ther shot.

The plates were then developed
nd put into the projector of the Zop-
c system with a 1,000 watt, tungsten
alogen bulb at 3,200 degrees Kelvin
hat matched the color spectrum of
e key lights used on the foreground
haracter. The plates for "Hero" were
standard 35mm, considered good
nough for television. For "Superman
," Perisic projected and filmed in Vis-
aVision. Color correcting was possi-
le using filters on the projector.

The actor was then put into his
steel-ribbed fiberglass body mold,
our of which were made for "Hero"
at a cost of about \$1,500 each. This
mold was hidden inside the flying cos-
ume with pockets and slits so that it
couldn't be seen at all. The mold fit on
the end of a steel pole sticking
through the front projection screen.

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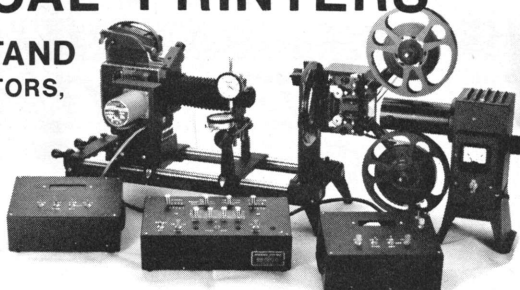
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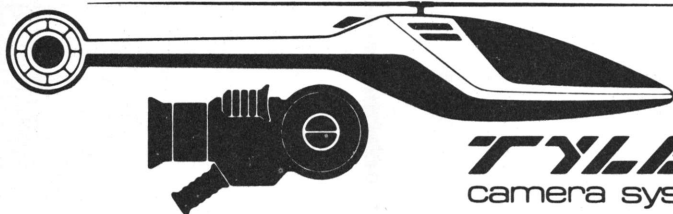
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The actor's body blocked the camera's view of the pole so he looked like he was floating in mid air. The pole held him about 20 feet off the stage floor and a gantry slid into place to service the actor or the air tube which ruffled his cape.

Then, as the background plate was projected on the screen, the camera in its special rig panned and tilted and rolled to create the flying motion. The actor didn't move, though it could be banked slightly, or angled relative to the camera using a knuckle joint on the end of the pole. However, that joint was usually only employed to set the proper attitude of the actor before the action began.

Nelson was euphoric about the quality and realism of the flying scenes he was getting from the Zoptic system. He said he never really felt that Katt was flying before but thought that with Zoptic the illusion was very convincing. With the sensitive camera moves that are possible and the ability to see the composite as it is made, the flying could be fine-tuned so that the geometry was correct. After four days of shooting of the Zoptic stage (as of October), Nelson said he thought the camera operators were becoming very smooth and confident in their flying.

There are some drawbacks to using the Zoptic system, primarily the loss of flexibility. Though turnaround is very fast because the composite image is ready as soon as the film can be developed, it takes a full shoot of the stage to get the composite. It would have been difficult for Nelson to get a specific shot for a late-season show the way he did under the old system by setting up a blue screen out on location. He would have had to do a setup on the Zoptic stage with a full crew.

Also, while he could build a library of composited shots using the Zoptic process, he couldn't draw on a catalogue of basic flying positions to set against new backgrounds. The Zoptic system could theoretically be used with a blue gel in the projector to create the equivalent of blue screen behind the actor, and provide a foreground image that could be combined with new background plates using Utimatte. But Nelson said he had no plans to do that. He felt that careful planning would provide him with the flying scenes he needed from the Zoptic setup, without having to return to video compositing and tape to film transfers.

Continued from page 27

encoded" with the "luminance." ImageVision is a patented method of color encoding which makes full use of the greater performance of today's equipment and also eliminates some of the problems resulting from the compromises that had to be made with the NTSC system in order to make color television compatible with black-and-white.

The maximum horizontal resolution achievable with an NTSC signal is approximately 250 television lines (TVL). While state-of-the-art video cameras are capable of resolving 700 to 800 TVL, ImageVision can make full use of the camera's resolving power because it processes the signal in a format which is not compatible with broadcast standards.

In addition it is possible to increase the vertical resolution of the video image with ImageVision by recording at 24 fps. Since the amount of detail that can be recorded in an image is a function of the amount of time spent scanning the image, changing the frame rate from 30 fps to 24 fps increases the potential resolution of each image; and it is a relatively simple matter to modify the equipment so that each frame is made up of 655 scan lines rather than 525. (655 x 24 is about the same as 525 x 30.) This presents approximately a 25% increase in the vertical resolution of the image. Moreover if the video image is designed purely for transfer to film and theatrical exhibition (and this is part of what ImageVision is all about), it is possible to record the video image in a 1.85:1 format by compressing the scanning pattern. Putting the scan lines closer together results in yet another increase in the vertical resolution of the image.

With ImageVision the frame rate and the image format are separate parameters which can be adjusted as required by the particular production and do not affect the increase in horizontal resolution achieved by the color encoding system which is the heart of ImageVision. Some applications of ImageVision have involved recording at 30 fps with a typical 1.33:1 format. If a production is destined purely for transfer to film, there are additional benefits to shooting at 24 fps since there will then be no discrepancy between the frame rate of the recording medium and the frame rate of the final exhibition medium.

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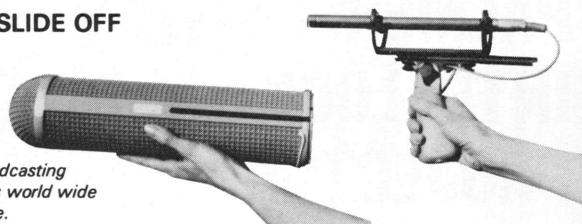
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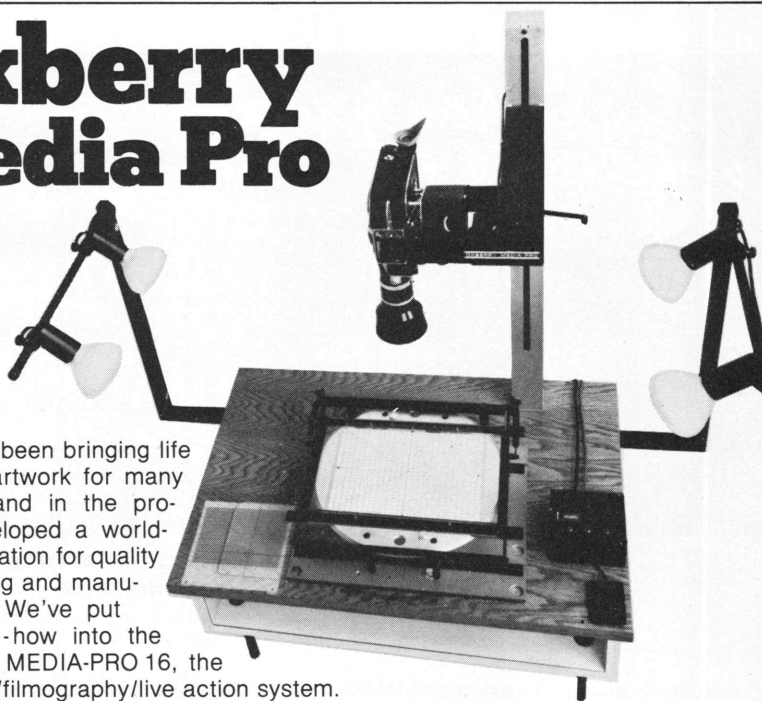
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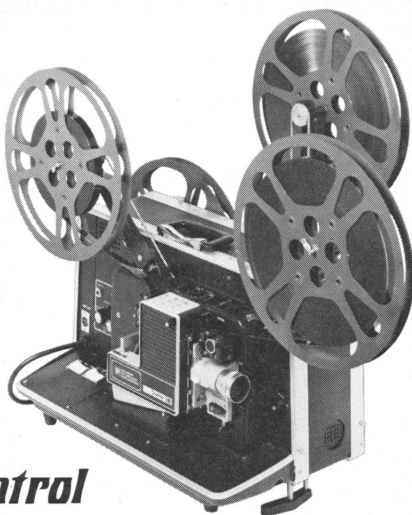
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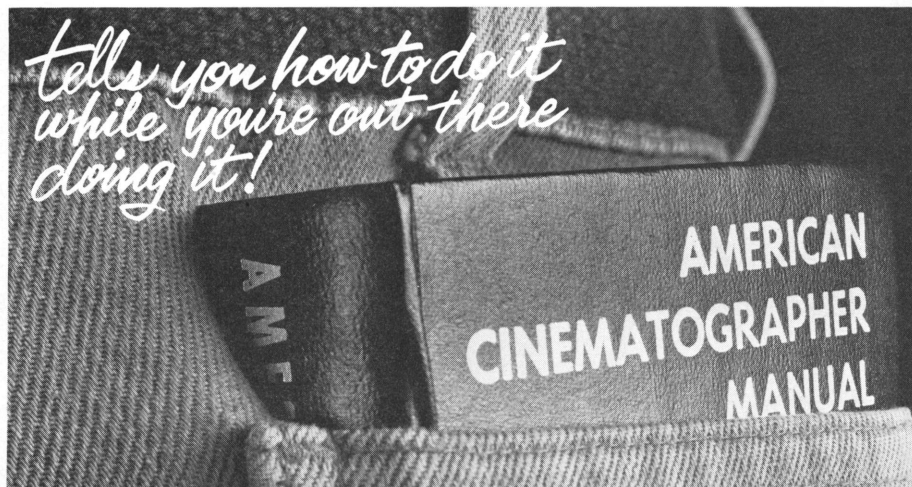
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Video have successfully modified cameras, recorders and editing equipment for ImageVision. They not as yet have the capability of doing digital effects in the ImageVision system, but they can do traditional effects and editing. They also have the capability of converting an ImageVision program to a standard NTS PAL or SECAM signal—though of course this involves sacrificing the higher resolution of the ImageVision image. One camera chosen for ImageVision work was the Bosch-Fernseh KCK-40, which has an advantage over other high resolution cameras in that it is a four tube camera with a separate tube for the luminance signal (i.e., the black-and-white component of the image). Since the resolution of the black-and-white component of a video image is always greater than any of the color information, it is advantageous to have a separate tube in the camera for the luminance signal. Normally in a three tube camera the luminance signal is concocted artificially from the red, green and blue signals. The tape recorders modified for ImageVision are 2" Ampex AVR-1 and AVR-2 quad machines. The only 1" VTR which lends itself to modification is the B-former Bosch-Fernseh machine. Monitors for displaying the ImageVision must be designed specifically for the system since the color dot spacing in a normal shadowmask picture tube is incompatible with the greater resolution of the ImageVision system.

For those readers who have been initiated into the mysteries of color encoding and speak the language of ImageVision can be described as a system using quadrature modulated carriers with phase alternations between lines on one color axis and frames on the other color axis. It uses a subcarrier frequency of 7.16 MHz and requires a transmission bandwidth of 8 to 10 MHz. The color bandwidth can be between 1.5 and 2 MHz. The processing of the signal also involves the application of the noise reduction techniques developed by Image Transform for their tape-to-film process.

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AMERICAN CINEMATOGRAPHER

transform's standpoint, the Python project turned out quite well considering that the conditions were not exactly optimum for tape shooting—lots of black in many scenes, limbo backdrops, and so on.

Jim Frazier switched the signals going to the large Eidophor screens at the Bowl and did the on-line editing of the project at Compact. Briefly, Eidophors are high-intensity video projectors which use a "light valve" system. The apparatus projects a very bright beam (5000 watts or so) through an oil film between two polarizing filters. The result is an extremely bright TV picture for a large screen. The Eidophors allowed the guy in the back of the house to participate," says Frazier.

A bit about lighting the project from Frazier's (technical director/tape editor) point of view: "Some of the props had to be repainted—a bright yellow truck had to be brought down to something more neutral. In the movie, it was a sort of beige. In general, the follow spots, the keys, were brought down; and the fill increased. The average footcandle level was 150–200.

The five cameras were actually—there was one hand-held, which produced very few usable pictures. The main five were located center-stage of the Bowl, two in front of the stage about ten rows back, and two cross-cameras in the wings."

Besides the two Eidophors, there was a third large screen at stage center. This was a conventional rear-projection setup, and was used as an adjunct to the live show to show the Bowl audience roughly ten minutes of what the Pythons shot in Germany which had never been released in the states before.

At the Bowl, as is customary these days, a truck was used as a primary control room. A music room was commandeered for use as a sort of "master control" or "camera control" room, housing the camera control units and some of the special ImeVision signal processing equipment. Titles for the film were synchronized, as opposed to being done optically on film.

Some of the bits in the final cut were originated on film. These included familiar pieces of animation from the Python TV series, and some sketches shot in Europe and not previously seen in the United States. These clips were transferred to Im-

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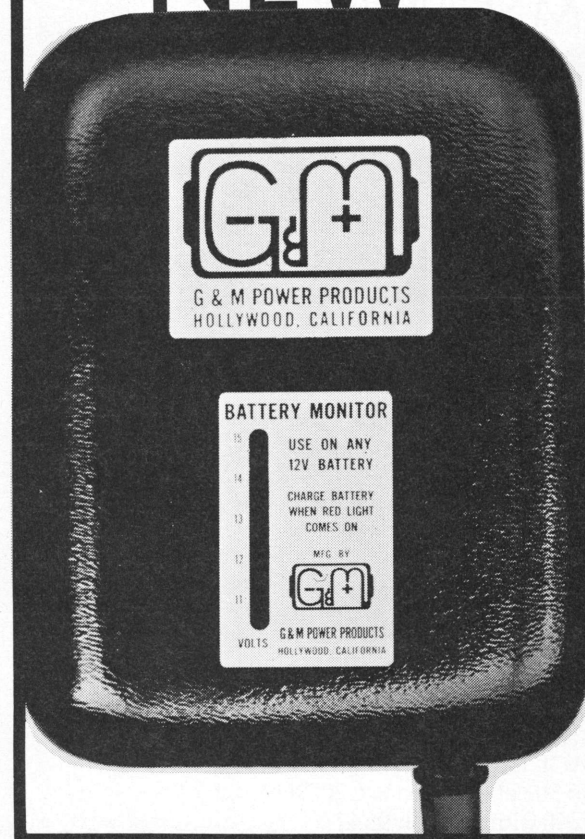


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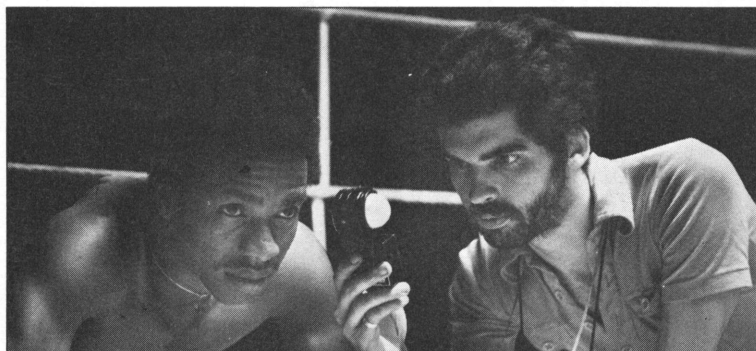
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ageVision-format videotape and into tape master. Jim did that editing which represents virtually the final of the release version. As an aside this season's run of "The Greatest American Hero" on CBS features effects shot in ImageVision. It's easier and cheaper to do many of the flying effects, for example, through chroma key or a similar video process where it's possible to see exactly what's taking place on the screen in process.

Steve Mitchell, manager of customer services for Compact, says the firm does not have to undergo the expense of a special editing bay exclusively for ImageVision bandwidth and signal requirements. Compact engineers require about an hour to convert a standard NTSC on-line two inch editing set-up to ImageVision format, and another hour to return it to NTSC configuration. There were some minor technical concessions made in the cutting of the film. The shooting did not come off flawlessly but those hitches which did occur were minor. Nevertheless, working with technology as new as most of this is (keep in mind the concert actually took place over two years ago, in September of 1980) there were times when a shot that should have been included in the final cut had to be omitted because of technical quality—interference with a wireless mike, or something of that nature.

Lighting director Bill Klages: "It was not a lighting show or a photography show. The thing was first to show these guys on stage and second to be aware of their audience, because they're an important part of it. You have to see them all the time, and they were lit all the time. You light the Hollywood Bowl for video just like you'd light it for film. We built trusses out over the stage, which was scaled down. We managed to cantilever a device out in front of the stage from those trusses to mount the front lighting, as opposed to doing it from the back of the house 250 feet away. The lighting is very simple, straightforward, precisely as I'd light a theatrical event for television.

"It's well-balanced because that's the way I light anyway. Ratios don't mean too much to us because we start at a quantity that you're used to working with, that the camera will accept, 100 footcandles or so, plus or minus 25. In this case, about 125. We had every instrument on a dimmer so we could make immediate adjustments. On the audience, we had just

much light as we could get, but full exposure was not required so it was low, for us anyway, perhaps 25 footcandles."

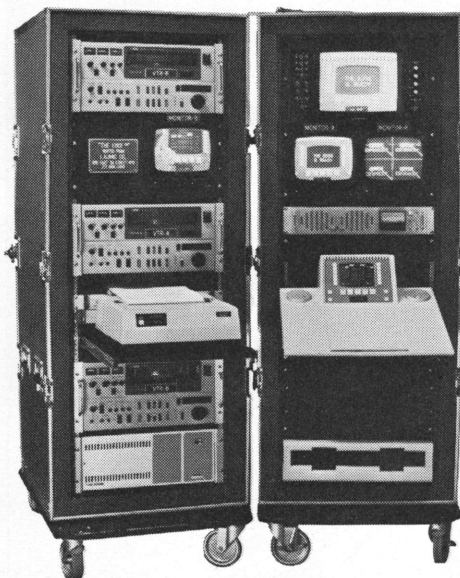
Director Terry Hughes' relationship with Monty Python dates back to the 60's and their days at the BBC. Terry was producing a show titled "The Ronnies," for which some of the Pythons were writing on a free lance basis. At the same time, they were also in production on their own BBC series. During the same period, Terry collaborated with Michael Palin and Terry Jones on a series entitled *Rip-Off Yarns*, a recreation of classic English schoolboy yarns of the 20's and 30's. Shot on film, it was an instant success.

Terry likes the Hollywood Bowl film because, as he puts it, "It's a very atmospheric concert film, a very good capturing of an event. It represents a very good opportunity for young people to experience Monty Python in an unusual live concert situation."

Terry, John Cleese and Eric Idle worked with Jim Frazier on the editing. Roughcuts of the tape were sent to England four times for review by the other Pythons. Based on the last of the four cuts, (a semi-final version of the finished product) it was decided that they would offer the recording for theatrical release. At this point, negatives were struck from the videotape, and the film actually became a "film" project. The Pythons did some fine editing of the film negative and then mastered, film-to-film. It was here that some release print quality was lost. Had all the cutting been done on the tape and then mastered as film, the generation could have been avoided and the resulting release prints could have been slightly better than they are. Again, the prints as released are quite good, but it should be stressed that they do not quite represent state-of-the-art tape-to-film quality.

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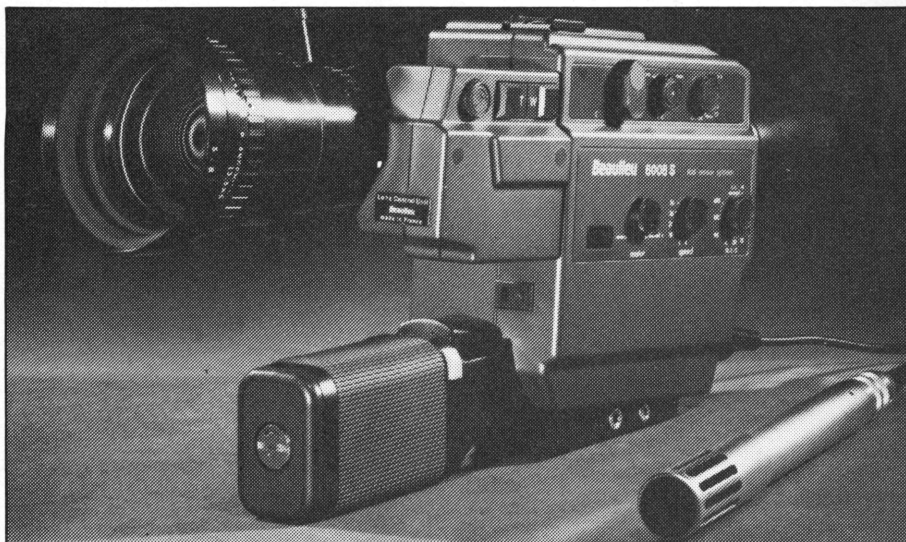
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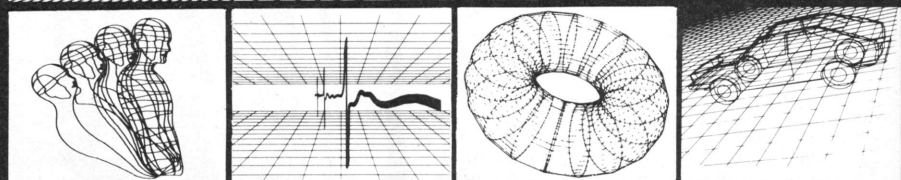
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Khmer Rouge
Continued from page 35

too common on extended shoots in the tropics. To guard against this, the film was triple wrapped in plastic bags along with generous amounts of silica gel. Then the entire package was wrapped in highly insulative "space blankets."

The production was shot on Kodachrome color negative 8528 and 8527. The Fuji has a slightly softer, more pastel look to it than 7247, which was particularly pleasing when filming the lush green foliage that makes up so much of the Cambodian landscape.

FILMING

There are a number of obstacles that must be overcome in the process of making a film in a politically troubled, war-torn area. Merely gaining access to the people and places one wants to work with can require a major effort. Our original schedule called for a six to eight week shoot in November and December of 1980. It was not to be so simple. In all, the filming took three separate trips to Cambodia totaling more than six months on location. The last footage was not shot until February of 1982.

I arrived in Bangkok on Nov. 1, 1980, where I joined Ackerman and soundman Senee Mongkol who had already spent a month in preproduction. We left for the border the following day. By prior arrangement with some local Khmer authorities, our point of entry to Democratic Kampuchea was to be near a small village north of Aranyaprathet. Early in the morning of Nov. 5th we parked our Land Rover under some trees, donned our backpacks, and set off for the border. We didn't get very far. The sight of three heavily loaded foreign dignitaries trudging off across the scrub oak plain caused quite a stir.

Within half an hour we had gathered a contingent of about 35 followers. Soon thereafter we were confronted by some young soldiers who told us politely but persistently that we must turn back by order of "higher authority." It took four hours of negotiations in French, Thai, and Khmer for us to learn that the week before an official Khmer Rouge radio broadcast had announced that no foreign journalists were to be allowed across the border. We were told that the only way to get around this order would be to receive written permission from "higher authority."

The search for "higher authority"

gued us for the next three months. ere is an official Democratic Kam- shean liason in Bangkok. In an in- asingly infuriating set of phone s to his officer we were told that he s either "very busy," or "out of n." By January he had still failed give us a definite answer to our eated written requests to visit mocratic Kampuchea.

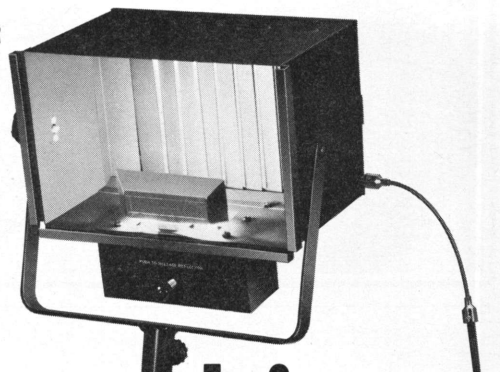
This by no means put an end to our rk, it only made it much slower and re tenuous. We very gently began develop relationships with some all groups of guerillas. We came t to visit and to talk. Sometimes, in der to pique their interest, we ough international magazines with tures of their soldiers. At other es we brought malaria medicines d antibiotics. Slowly we gained eir trust and finally they allowed us film.

Midway through the shoot we be- me friendly with a woman named anny Sak. Channy was born in mbodia, but she left to go to school the U.S. before the revolution. She as now in Thailand trying to get her ther out of a refugee camp. Her pther had died during the Pol Pot ars. She agreed to spend two eeks with us as a translator. Her esence completely altered the char- ter of the filming, not only because e was a good translator, but much ore importantly because she was a tive Khmer. While most Khmers ewed us as somewhat of an intru- on on their lives, they beheld anny as an endless source of fas- nation. She lived in the "outside orld," she wore blue jeans and ilored blouses, but she was mer, she was one of them. The rap- ort that was immediately estab- lished between them was phenome- l. Whereas our questions about the volution were often met with silence d suspicion, the local cadres ear- ly told Channy about the past. ore than once they tried to entice r into staying behind and joining the ht. While all of this attention was cused on her, we vanished into the ckground, quietly working away th no one giving it a second ough.

When Channy was not around theamera-shy nature of the Khmers, rticularly the women, was a real oblem. Often I had to set a frame ing a long lens, then turn com- etely away from the scene I wished shoot and wait. Sometimes my pa- nce was rewarded with very quiet,

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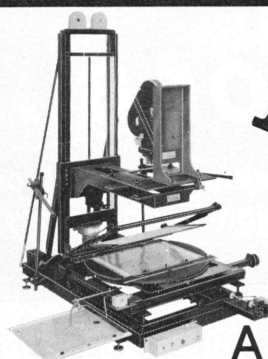
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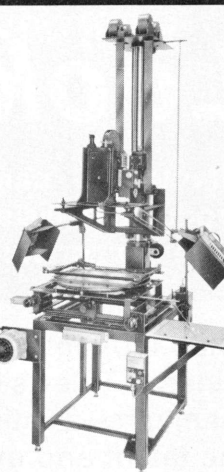


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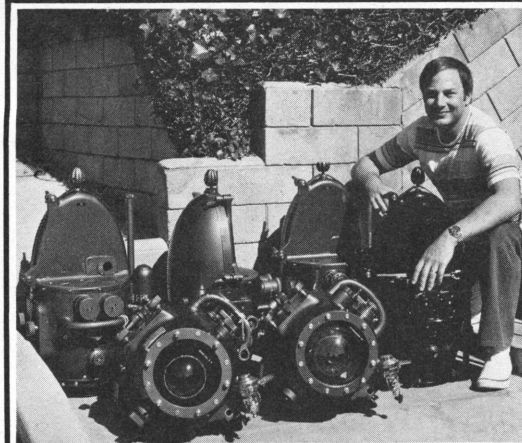
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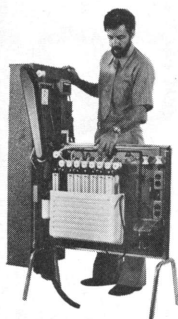


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almost meditative moments. At other times, I managed to film wonderful un-selfconscious interchanges, personal dialogues, and playfulness.

We used a number of small tricks to encourage spontaneity and discussions about the past. Sometimes I showed them an Air Force map of Cambodia. This huge map generated great excitement. People would quickly gather around and start pointing out their homes or major landmarks. With minimal encouragement they showed us the sites of old battles and gave detailed descriptions of major events. Seeing their homes on the map caused many soldiers to feel homesick and inspired them to talk about their families and the way things were before the war. At other times, we circulated pictures of the Pot or the massive labor camps to break through the tight-lipped defensiveness of so many of the people we met. For the most part, they chose not to think too much about the past. Instead, they dreamed about the glories of their future victory.

EXPOSURE PROBLEMS

The intense tropical sun contributed to a number of filming problems. People in Asia do not like to bask in the sun. On the contrary, they seek shelter from it whenever possible. Shelter often consists of thatched roof structures without any side walls. It is not uncommon to find a situation where the proper exposure for someone in the shade is T. 1.3 and the background areas are T. 22. My only hope here was to minimize the amount of bright background area within a particular shot. Even so, even with the best prime lenses, flare was often a problem. I tried to use silver "space blankets" as reflectors, but neither they nor the 100-watt sun gun were much help under the extremes.

We encountered similar situations anywhere people gathered; children at school, the wounded in field hospitals, a blacksmith shop, telegraph stations, and on jungle trails. The problem is even worse with high speed film.

I considered post-flashing or Cheburek's method of toning the negative as one means of dealing with this contrast problem, but I have never been completely happy with either of these processes in 16mm. Furthermore, since I was working without a camera assistant, I could not afford to spend a lot of time shortending, loading, and keeping

lack of flashed and non-flashed rolls. Without reasonably powerful lights and lots of large reflectors, the only thing I could do was to manipulate the situation so the most important shots had a minimum amount of bright light directly behind the people in the scene. In the school, that meant a high angle master shot, at the blacksmith it was a very low angle close-up. The S.R.'s versatile viewfinder was a great asset in these convoluted setups. At one hospital I persuaded a group of soldiers to stand along an open wall in order to block most of the background light. During one interview I had a section of the roof of a hut removed to bring in more foreground light.

Extensive night filming contributed to the mysterious, mythological presence of the followers of the Angka. With high speed Fuji negative film and the 100-watt sun-gun I was able to get acceptable exposures with either the 9.5mm-57mm Angenieux zoom or the Zeiss super speed prime lenses. Of course, the image quality of the super speeds is superior to that of the zoom lens wide open. However, I occasionally chose to sacrifice a little image quality in order to gain the variety of focal lengths afforded by the zoom lens. Changing prime lenses in the middle of an event, without a camera assistant, can waste valuable time; important shots may be missed. In other situations the super speed primes were essential. During one scene a group of women is shown talking around a fire. Unfortunately it was a dim fire and the woman doing most of the talking was sitting about six feet from the meager flames. The proper exposure for her was a little less than T. 0.7. I decided to use the sun-gun with an orange gel about 20 feet away from the fire. It raised the light level to about T. 1.1; just enough for the super speed to render a good image, but not so much that the scene looked lit.

For security reasons, the military commanders forbid us to use the sun-gun whenever we were away from secure base camps (the bright light could be seen for miles across the darkened landscape). Two key scenes towards the end of the film were shot under these restrictions. The most dramatic involved a troop movement at the edge of the jungle around midnight. My eyes could just perceive a snake-like progression through the darkness. The only light came from the soldiers' 3-volt flashlights. In-

structions were passed through the group of perhaps 250 men that they were to shine their lights on the back of the legs of the person in front of them. I then took 5 soldiers and had them form a "key light" aimed at the faces of their comrades. The light level was so low it was not worth measuring—it was a case of push two stops and pray. The results are great. In the foreground, faces appear momentarily and then disappear into the darkness while the dim lights of the others trail off into the distance, barely perceptible, but betraying the presence of an army of the night.

LOCATIONS

Throughout the first shoot our lack of permission from "higher authority" caused us to fight very hard for each new location. We had information that there were groups of Khmer Rouge in the mountains near Cambodia's northern border with Thailand. Our search for them brought us to a group of hunters who often crossed the border while tracking wild boar. They told us they had seen some "Pol Pots" recently. At first they were very leery about taking us inside. They weren't at all sure how isolated bands of soldiers would react to these strangers with cameras, and they were very concerned about land mines along some of the trails. Besides, they were not certain the Khmer Rouge were still in the area. But Ackerman insisted, and for once we got our way. We set out early the next morning climbing up and down the mountains searching for the Khmer Rouge. We found many signs of their presence: spent artillery shells, bits of uniforms, and footprints of Ho Chi Minh sandals. One night we reached a high waterfall that had been home to perhaps 100 soldiers. We found a number of old cooking sites and even a couple of bags of abandoned rice, but no troops. The rewards for our efforts were minimal. In the course of five days we had gathered only two small ginseng roots, one defused land mine, and filmed 300 feet of landscape.

Access to another area we wanted to work in was controlled by mercenary troops, led by a man referred to as "Mountain Tiger." After a number of late night meetings fueled by copious amounts of local moonshine and a few Playboy magazines he agreed to let us pass through his territory. On arriving at our destination, a Khmer Rouge stronghold in the mountains,



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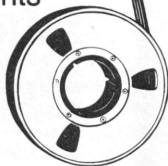


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we were graciously welcomed and promptly informed that before we could do any filming we must obtain clearance from "higher authority."

Nevertheless, by January we managed to shoot 24,000 ft. of film and had a fairly complete portrait of life in the guerilla army of the Khmer Rouge. It was the only comprehensive film footage to come out of Democratic Kampuchea in five years, but it was incomplete. We were still missing important aspects of civilian life, the current leadership, and the front line army.

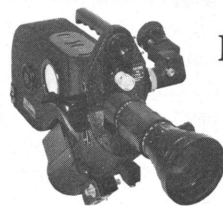
We returned to Paris where the footage was processed by Telcipro labs under the direction of Charly Meunier. I was very pleased with the results. The equipment had all performed flawlessly and the filmstock had withstood the strain of 2½ months in Asia with no real problems. Jacques-Olivier Chattard, French Television's co-producer in charge of the project, reviewed the rushes and found them extraordinary. He agreed, however, that we needed a number of other scenes and locations to finish the film. Editor Nguyen Long cut a 20 minute sample reel that was used to raise additional production funds and to demonstrate to the government of Democratic Kampuchea the type of work we intended to do.

In July of 1981 Ackerman, Mabuchi, and I returned to Democratic Kampuchea, this time as the guests of "higher authority." Whereas our contact with the Khmer Rouge on the first trip was confined primarily to small groups of guerillas, we were now allowed access to large groups of civilians and to the regular army.

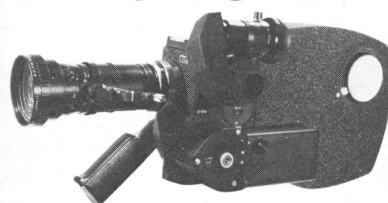
During the next few weeks we were privileged to tour a number of new villages, meet top governmental officials, attend a revolutionary and traditional arts performance, witness the birth of a child in a remote jungle hospital and meet General Ny Kon, regional commander of The Peoples Army. Our association with Ny Kon led to extensive work with the army in all aspects of its operation.

For the Army, the rainy season is a time to re-supply and secure troop positions. Most of the supply work is carried out by the women's logistical corps known as the Mitr Naree. Groups of up to 300 young women act as a human caravan moving arms, ammunition, food, and medical supplies to the front line and evacuating wounded troops on their way back to border supply points. Although they

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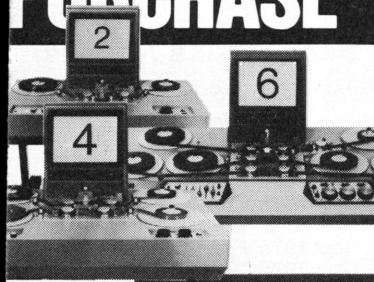
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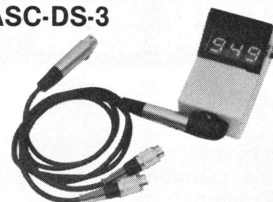
function as a separate unit from the
mostly male fighting forces, the Mitr
Naree are a crucial element in the
Khmer Rouge's struggle for survival.

In Battambang province, all military
activities are overseen by General Ny
Kon. He is a quiet man, about medium
height with a slight, taut build, and
thoughtful, but very precise eyes. We
worked with him both during the rainy
season and extensively, on our final
trip to Cambodia, during the following
dry season.

For reasons of mobility and vis-
ibility, our travels with Ny Kon and his
men required that we limit our equip-
ment to the absolute minimum.
Among other things, the tripod had to
be left behind. I had anticipated this,
and since I like to do a fair amount of
long takes on a long lens, I brought
along a Gitzo monopod. It proved to
be very valuable. By bracing the
monopod against some jungle foliage
or one of the small dikes that criss-
cross the rice fields, I could shoot at
150mm without too much trouble.
Even more important was the help it
gave me during lengthy sessions such
as Ny Kon meeting with his com-
manders or addressing his troops.
For example, one day after marching
for several hours the general stopped
to lecture to his assembled troops.
With the camera on the monopod, I
shot the first three minutes of his
speech with a very tight close-up on
his face. I then had another four min-
utes to film the hundreds of men and
women to whom he was talking. At
first I left the camera on the monopod
and picked up a number of telephoto
"compression" shots of the rows of
people and weapons that made up
the crowd. I then moved in and shot a
number of details: faces listening,
nervous hands fingering ammunition,
a row of women sitting on artillery
shells. And then, I went hand-held for
some shots moving through the
crowd. Had I done the entire shoot
hand-held, I would not have had the
option of filming so many tight shots
that add greatly to the intensity of the
scene. The opening shot of Ny Kon
would have been looser and I think
less effective. In many ways the
monopod allowed me to take chances
that I might have otherwise lost.

This shoot was also my introduc-
tion to the Asian rainy season, which
is a very mixed blessing in terms of
filmmaking. Working in the rainy sea-
son is very atmospheric; the light is
softer than in dry season and often
very dramatic. There are threatening

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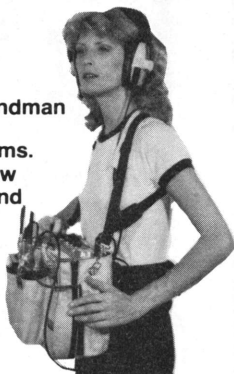
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clouds and lots of mist to punctuate the landscape. All of the difficulties of trying to live in the midst of the jungle are accentuated. Water and mud is everywhere; in a rice field it can be waist deep. Soldiers attempt to sleep through the downpours with nothing more than a thin nylon hammock for shelter. Malaria is epidemic and medicine, as always, is scarce.

The best way to move equipment and supplies through the mud is by elephant; they never get stuck. They are very smart, for the most part gentle, and surprisingly agile. They also can be used as a stationary shooting platform and even a somewhat rocky dolly.

Shooting from a truck in the rain is a far more taxing experience. The only roads controlled by the Khmer Rouge are jeep trails. When they are wet, they are virtually impassable except by four wheel drive vehicles that must be driven very roughly to avoid becoming hopelessly stuck. When moving, mud is flying everywhere and so are many people riding in the back. Despite this, by having someone hold me as I sat off to one side, I was able to get some very effective coverage of these journeys. Obviously, wide angle shots were the smoothest, but an occasional shaky close-up proved very useful.

Keeping the camera dry and free from mud was a major concern. Where possible, I had someone holding an umbrella, but more often than not I had to rely on my rain cover, which doesn't always work that well. Some water always seems to find its way down the lens shade and onto the lens. During very heavy rains the filter over the front element became so wet that the image would become obscured. Attempts to clean the filter with lens tissue proved worthless. A cloth bandana was somewhat effective, but tended to leave lots of streaks. A number of times I used Dust-Off to blow the water away, but if I did it too often, the Dust-Off would chill the glass in the filter, causing it to fog over completely. Amazingly enough the camera continued to perform well throughout all of this abuse.

For all the trouble one goes through to shoot in the rain, the results can be disappointing. Unless it's pouring, rain just doesn't read that well on 16mm. Since Ackerman wanted to emphasize the oppressiveness of the rain, we decided to use fog filters to heighten the effect. In many cases the filtered footage feels more "real"

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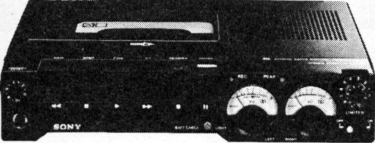
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than the unfiltered. It is a useful technique, but one that can be easily overdone.

In all we shot about 50,000 feet of color negative inside of Democratic Kampuchea. The months of working with the Khmer Rouge had been a physical endurance test for both myself and my equipment. That we both survived well is a tribute to the extensive planning and conditioning that preceded the shoot. The technical accomplishment, however, was not the most difficult part of the job. Throughout my work in Cambodia, I struggled to reconcile my preconceptions of the Khmer Rouge, based on what I knew to be their bloody and tragic history, with the reality of the brave, determined individuals I met on my journey. It still is not clear to me. I tried to understand them on a simple, human level. The people who are with the Khmer Rouge are now survivors. They lived through the American bombings during the Vietnam War, their own long and bitter revolutionary war, the ravages of their own victory and independence, and finally the invasion of the Vietnamese. Some of them, such as 10 year old Khom, an orphan who was raised by the Angka, have never known anything but war. Khom is an innocent little girl. At one moment she is cuddling playfully with the women who take care of her and in the next she is in a makeshift schoolhouse chanting a horribly graphic poem about death to the Vietnamese. It is profoundly disturbing. To film in these situations requires an odd mixture of detachment and compassion: the documentary filmmaker practices a craft which is part technical and part artistic, but the lives that he touches are by no means a fiction.

"Beneath the Angka" premiered at the Mannheim Film Festival in October, 1982. It is a production of Justin Ackerman Films, Magic Circle Films, and French Television TF-1. The film was edited by Dominique Auvray and Nguyen Long. Music by Brian Eno and Klaus Shultze. Fuji Negative was processed by Telcipro, Paris and Du Art, New York. Prints by Telcipro.

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Blattnerphone

Continued from page 40

chronization. A DC-motor supplied by a conventional auto storage battery drove the capstan; despite the tape's perforations and because of speed variations inherent to the DC-drive, synchronization could only be maintained by achieving a constant transport speed, which could only be guaranteed by monitoring a tachometer affixed to the shaft driving the tape take-up reel. Any variations in transport speed would register on the tachometer, signaling the apparatus' operator to adjust accordingly the speed with a rheostat connected to the motor's circuitry. Monitoring the tape speed was crucial since for Stille's machine to maintain an acceptable frequency response the tape had to travel about 60% faster than its accompanying projected film reel. Stille claimed, though, that the thinness of the tape provided a sound reel of approximately the same diameter as the film reel, each providing together twenty minutes of sound and image. Stille proposed that the tape could incorporate electromagnetic impulses for triggering special auditorium effects, to darken or illuminate the theatre, and to raise and lower the house curtains.

During the fall of 1928 and throughout 1929 Blattner conducted demonstrations of Stille's magnetic dictation machines at the Elstree studio; finally, on October 10, 1929 Blattner presented Stille's prototype magnetic recording apparatus for sound films to the public, and included a short film synchronized to the machine's tape. One observer commenting on the demonstration claimed that "... the picture was very realistic, and the sound record distinct and well-synchronized." A leading British technical journal cited the operational benefits of Stille's device compared to disc and photographic sound recording, stressing the re-useability of the magnetic medium, its apparent good synchronization, and the relative high cost of photographic sound recording equipment. Incredibly, according to British film director Michael Powell (then working at Elstree as a cutter for Blattner) the sound quality of Stille's primitive tapes was superior to that of the Tobis-Klangfilm photographic system, at that point plagued with film noise problems. Throughout 1929 and 1930 Stille filed several British patents describing various ancillary devices for use in editing the tapes produced by the "Blattnerphone," as Blattner named the apparatus. As can

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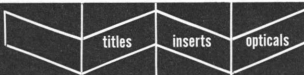
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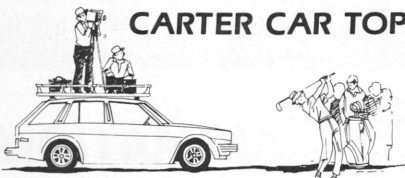
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be imagined, the tapes could only be edited by using tin shears and solder.

BBC AND BLATTNERPHONE

As the description of the Blattnerphone might indicate, little enthusiasm for the device was manifest in the film industry. The Blattnerphone's "double-system" character and problematic synchronization made it no more attractive than the disc systems already jettisoned by the industry; despite its re-useability, the tape medium was costly and of a relatively exotic charcoal iron compound manufactured only in Sweden. The tapes also showed poor magnetic retentivity and were susceptible to degeneration from stray magnetic fields. By 1930, the photographic sound processes promoted by huge electrical concerns like Western Electric and RCA swiftly became the film industry's standard, forcing all other systems and many other manufacturers out of the market.

The financial resources of the Ludwig Blattner Picture Corp., Ltd., had diminished quickly by 1930. Blattner's film projects proved stillborn, forcing him to exploit his only remaining asset as part of a between-shows entertainment at London cinemas, wherein the audiences were treated to listening to their own voices, recorded and reproduced over the Blattnerphone. The Blattnerphone, though, was not to be relegated to being a mere sideshow technical curiosity. The chief engineer of the British Broadcasting Corporation had attended the October 1929 demonstration of the Blattnerphone. With the development of a BBC short-wave international service imminent, the BBC engineering staff sought an appropriate recording method with which to handle the daily time-zone rebroadcasting necessary for such a worldwide service. The BBC determined that the Blattnerphone fulfilled the requirements for an optimal broadcast transcription method, including an acceptable frequency range, short start-up and set-up intervals, and, compared to discs, a relatively long recording duration. The BBC obtained an option from Blattner on the machine in 1930, and over the next two years purchased outright several Blattnerphones for testing. The perforations in the tape, redundant and ineffectual as they were, had been earlier abandoned by Blattner, but the unreliable DC motor required speed monitoring and maintenance by tachometer and rheostat even

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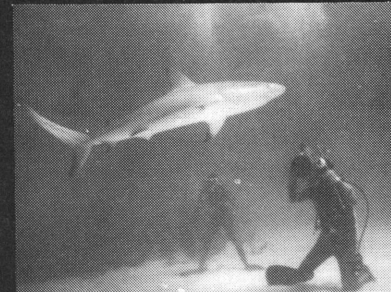
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By 1932, in anticipation of the new Empire Service for which the BBC intended the Blattnerphone, the BBC engineering staff developed a second generation Blattnerphone featuring an AC-synchronous motor for better speed stability and improved amplification and equalization circuits. Throughout the early 1930s the Blattnerphone reliably recorded BBC programming for daily rebroadcast over the Empire Service, as well as recording and re-producing programs edited from Blattnerphone tapes.

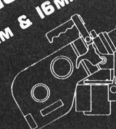
In 1933, after several years of inactivity, the Ludwig Blattner Picture Corp., Ltd., was liquidated by the British courts. The month after Blattner received the liquidation order he sold his Stille rights to the giant Marconi's Wireless Telegraph Co., Ltd., which set about to develop a totally revamped recording machine based upon the Blattnerphone, featuring improved heads, circuitry, and tape transport system. This Marconi-Stille equipment became the foundation of the BBC's extensive recording plant until superseded by plastic tape machines after World War II. Almost simultaneously, another Stille license holder, Echophon Maschinen AG, sold its Stille rights to the mammoth International Telephone and Telegraph Company which assigned them to its German communications subsidiary, C. Lorenz AG; by 1936 Lorenz had developed a compact, portable, innovative steel tape machine to compete against the larger Marconi equipment in the growing European broadcast transcription market. Meanwhile, this magnetic recording technology attracted little attention in the United States, where the American radio networks resolutely resisted broadcasting recorded material, a prejudice which would endure until after the war.

With Stille-based machines threatening to dominate the broadcast market in Europe, a partnership formed by the German electrical trust AEG and the chemical and plastics cartel IG Farbenindustrie arose in the early 1930s to develop a rival magnetic recording system to challenge those of Marconi's and Lorenz; by the beginning of World War II the collaboration between AEG and IG would produce the basic design principles, including ring heads, high-frequency biasing, and plastic tape, which underlie the electronics and media for today's magnetic tape recorder.

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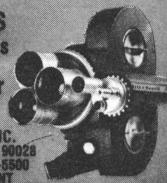
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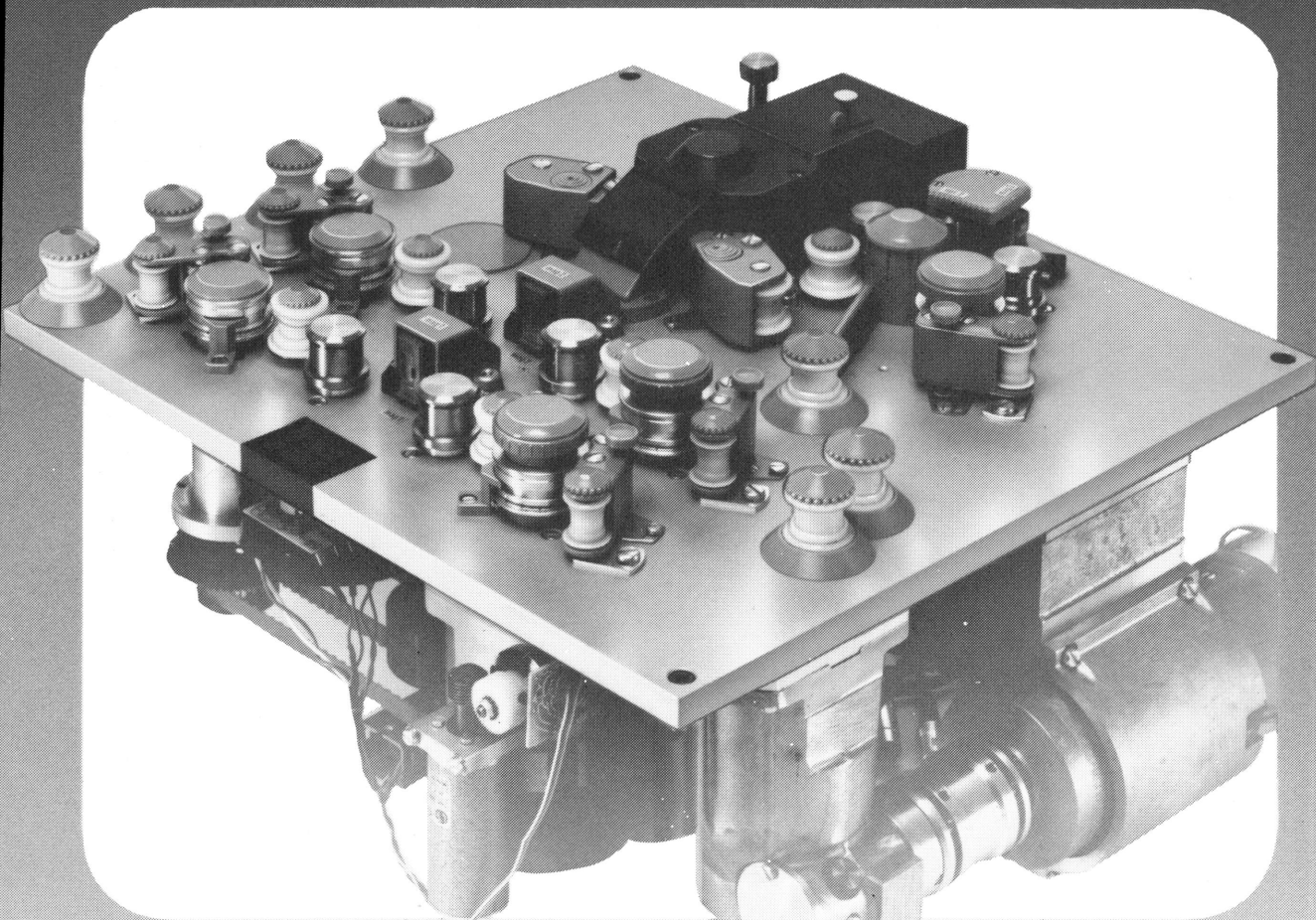
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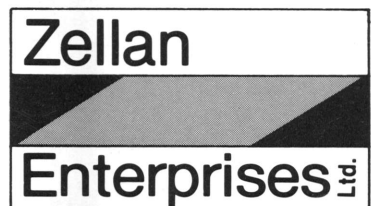
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